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Docket No.

V-W- '95-C-272

Respondent

UNILATERAL ADMINISTRATIVE ORDER FOR REMOVAL ACTIONS

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I. INTRODUCTION AND JURISDICTION

1. This Order directs Respondent to perform the removal actions described herein to abate an imminent and substantial endangerment to the public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances at or from the Site. This Order is issued to Respondent by the United States Environmental Protection Agency ("U.S. EPA") under the authority vested in the President of the United States by § 106(a) of CERCLA. This authority was delegated to the Administrator of U.S. EPA on January 23, 1987, by Executive Order 12580 (52 Fed. Reg. 2,926), and was further delegated to the Regional Administrator on September 13, 1987 by U.S. EPA Delegation No. 14-14-A and 14-14-B, and to the Director, Waste Management Division, Region V, by Regional Delegation Nos. 14-14-A and 14-14-B.

II. PARTIES BOUND

2. This Order shall apply to and be binding upon Respondent and its successors and assigns. Respondent is responsible for carrying out all actions required by this Order. No change in the ownership, corporate status, or other control of Respondent shall alter any of Respondent's responsibilities under this Order.

3. Respondent shall provide a copy of this Order to any prospective owners or successors before a controlling interest in Respondent's assets, property rights, or stock are transferred to the prospective owner or successor. Respondent shall provide a copy of this Order to each contractor, subcontractor, laboratory, or consultant retained to perform any Work under this Order, within five days after the effective date of this Order or on the date such services are retained, whichever is later. Respondent shall also provide a copy of this Order to any person acting on behalf of Respondent with respect to the Site or the Work and shall ensure that all contracts and subcontracts entered into hereunder require performance under the contract to be in conformity with the terms and Work required by this Order. With regard to the actions undertaken pursuant to this Order, each contractor and subcontractor shall be deemed to be related by contract to Respondent within the meaning of § 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3). Notwithstanding the terms of any contract, Respondent is responsible for compliance with this Order and for ensuring that its contractors, subcontractors and agents perform all Work in accordance with this Order.

4. Not later than thirty (30) days prior to any transfer of any interest of Respondent in any real property included within the Site, Respondent shall submit a true and correct copy of the transfer documents to U.S. EPA, and shall identify the

transferee(s) by name, principal business address and effective date of the transfer.

III. DEFINITIONS

5. Unless otherwise expressly provided herein, terms used in this Order which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in the statute or its implementing regulations. Whenever terms listed below are used in this Order or in the documents attached to this Order or are incorporated by reference into this Order, the following definitions shall apply:

a. "Action Criteria Document" shall mean the November 1993 U.S. EPA document entitled "Action Criteria for Superfund Removal Actions at the Kerr-McGee Residential Areas Site, West Chicago, Illinois" which is attached hereto as Attachment 3. The Action Criteria Document is incorporated into this Order and is an enforceable part of this Order.

b. "Action Memorandum" shall mean the U.S. EPA Action Memorandum relating to the Site signed in November 1994 by the Remedial Project Manager/On-Scene Coordinator and the Regional Administrator, U.S. EPA, Region V, and all attachments thereto, which is attached as Attachment 2. The Action Memo is incorporated into this Order and is an enforceable part of this Order.

c. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 to 9675.

d. "City" shall mean the City of West Chicago, DuPage County, Illinois.

e. "Day" shall mean a calendar day unless expressly stated to be a working day. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the end of the next working day.

f. "EE/CA" shall mean the August 1994 Engineering Evaluation and Cost Analysis conducted by U.S. EPA pursuant to Section 300.415(b)(4)(i) of the NCP.

g. "IEPA" shall mean the Illinois Environmental Protection Agency.

h. "IDNS" shall mean the Illinois Department of Nuclear Safety.

i. "Kress Creek NPL Site" shall mean the Kerr-McGee Kress Creek/West Branch of DuPage River Site placed on the NPL in February 1991.

j. "Lindsay Light" shall mean the Lindsay Light and Chemical Company.

k. "National Contingency Plan" or "NCP" shall mean the National Contingency Plan promulgated pursuant to § 105 of CERCLA, 42 U.S.C. § 9605, and codified at 40 C.F.R. Part 300, and any amendments thereto.

l. "NPL" means the "National Priorities List" as defined in Section 300.5 of the NCP.

m. "NRC" means the United States Nuclear Regulatory Commission.

n. "Paragraph" shall mean a portion of this Order identified by an Arabic numeral.

o. "Performance Standards" shall mean those cleanup standards, standards of control, and other substantive requirements, criteria or limitations, identified in the Action Criteria Document, Action Memorandum and Statement of Work, that the Work required by this Order must attain and maintain.

p. "REF" shall mean the Kerr-McGee Rare Earths Facility, 258 Ann Street, West Chicago, Illinois.

q. "Residential Areas NPL Site" shall mean the Kerr-McGee Residential Areas Site placed on the NPL in August 1990.

r. "Residential Areas Removal Site" or "Site" shall mean all properties within the Residential Areas NPL Site and the Kress Creek NPL Site at which U.S. EPA determines that Respondent shall perform Work.

s. "Respondent" shall mean the Kerr-McGee Chemical Corporation.

t. "Response Costs" shall mean all costs, including direct costs, indirect costs, and interest incurred by the United States to perform or support response actions at the Site, including, but not limited to, contract and enforcement costs.

u. "RPM/OSC" shall mean U.S. EPA's Remedial Project Manager/On-Scene Coordinator.

v. "Section" shall mean a portion of this Order identified by a Roman numeral and includes one or more paragraphs.

w. "Section 106 Administrative Record" shall mean the Administrative Record which includes all documents considered or relied upon by U.S. EPA in preparation of this Order. The Section 106 Administrative Record Index is a listing of all documents included in the Section 106 Administrative Record, and is appended hereto as Appendix 1.

x. "State" shall mean the State of Illinois.

y. "Statement of Work" or "SOW" shall mean the statement of work for implementation of the removal actions at the Site, which is attached hereto as Attachment 1. The Statement of Work is incorporated into this Order and is an enforceable part of this Order.

z. "Work" shall mean all actions Respondent is required to perform under this Order and all attachments hereto, including, but not limited to removal actions.

IV. FINDINGS OF FACT

Based on available information, including the Section 106 Administrative Record in this matter, U.S. EPA hereby finds that:

6. The REF was established in 1932 by Lindsay Light to extract thorium and rare earth compounds from ore, a process which

produced mill tailings classified as "11(e)(2) byproduct material" pursuant to 42 U.S.C. § 2014(e)(2). NRC records indicate that, during the 1930's and 1940's, Lindsay Light transported mill tailings from the REF for disposal at the areas now known as the Kerr-McGee Reed-Keppler Park and West Chicago Sewage Treatment Plant NPL Sites and that, in the process of such transport, mill tailings came to be located at the Site. Preliminary investigations by the U.S. EPA indicate that Lindsay Light also transported mill tailings in a company truck from the REF to the Site upon request for use as fill, posted a notice on a company bulletin board advertising the availability of mill tailings for general use as fill, and allowed people to remove mill tailings from the REF for use as fill at the Site.

7. The Lindsay Light and Chemical Company merged into the American Potash & Chemical Company in 1958; the American Potash & Chemical Company merged into Respondent in 1967.

8. The REF ceased operations in 1973 and is undergoing closure proceedings through the IDNS.

9. The REF mill tailings located at the Site contain radionuclides, which radioactively decay, emitting ionizing radiation such as alpha particles, beta particles and gamma radiation. Exposure to ionizing radiation, if at sufficiently high doses and dose rates, can cause carcinogenic, genetic and

teratogenic effects. The mill tailings also contain heavy metals, including lead, barium and chromium. Effects of chronic exposure to low levels of lead range from anemia to impairment of the nervous, hematopoietic and cardiovascular systems. The effects of exposure to barium can include paralysis, cardiovascular abnormalities and gastroenteritis. Chronic ingestion of hexavalent chromium can cause kidney damage, while chronic inhalation can cause lung cancer.

10. The Site is not secured to protect the general public or individual residents from contact with hazardous substances.

11. Based on results of investigations done on behalf of the NRC and the U.S. EPA, and taking into account such factors as populations at risk, the potential of hazardous substances being present, the potential for contamination of drinking water supplies and the destruction of sensitive ecosystems, the Residential Areas NPL Site was placed on the NPL in August 1990.

12. During 1984 and 1985, Kerr-McGee and the City conducted cleanup actions at 116 contaminated properties within the City that had been identified as contaminated by Kerr-McGee, based on a gamma exposure rate criterion of 30 μ R/hr at 1 meter from the ground surface. Several properties within the City were not cleaned up, either through failure to obtain access from the property owner or technical impracticabilities in removing

contaminated material. In addition, although a number of properties outside the City exceeded the 30 μ R/hr criterion, only one of them was cleaned up, because the City declined to allow the contaminated materials to be brought into the City. U.S. EPA staff was sometimes present at these cleanups, but the cleanups were never formally approved by U.S. EPA or carried out pursuant to any U.S. EPA program.

13. In November 1993, U.S. EPA established criteria for the identification and cleanup of radionuclides at the Site. The U.S. EPA criteria are more stringent than the 30 μ R/hr criterion used in the 1984 and 1985 cleanups and are contained in the Action Criteria Document. The U.S. EPA believes that the presence of any lead, barium and chromium at the Site is due to the presence of the mill tailings and that excavation of the mill tailings to the cleanup standards for radionuclides contained in the Action Criteria Document will adequately mitigate any risk presented by these metals. U.S. EPA is conducting a pilot study to determine if metals are present at levels of concern. If, after completion of the pilot study, U.S. EPA determines that response action beyond that required under the current terms of this Order is necessary to mitigate any risk presented by the metals, U.S. EPA will follow the procedures in Section IX (Additional Work).

14. Since U.S. EPA will have had a planning period of at least six months before on-Site actions are initiated, the removal actions at the Site are considered "non-time-critical" and, therefore, U.S. EPA conducted the EE/CA, as required by Section 300.415(b)(4)(i) of the NCP.

15. In January 1994, EPA began fieldwork to identify areas that exceed the Discovery and Characterization Criteria set forth in the Action Criteria Document.

16. On April 14, 1994, U.S. EPA sent Respondent a general notice of potential liability, which notified Respondent that Respondent is considered a potentially responsible party under Section 107(a) of CERCLA and encouraged Respondent to agree to reimburse U.S. EPA for costs incurred by U.S. EPA at the Site and to voluntarily perform removal actions at the Site. In reply to the notice, Respondent indicated that it would be willing to enter negotiations with U.S. EPA regarding an administrative order on consent for such response actions. Respondent and U.S. EPA pursued negotiations through October 1994. On October 31, 1994, Respondent notified U.S. EPA that it could not accept the terms of the administrative order on consent offered by U.S. EPA, and, therefore, U.S. EPA deemed negotiations to have failed.

17. In November 1994 U.S. EPA issued the Action Memorandum for the Site, pursuant to OSWER Directive 9360.3-01, selecting the removal actions described in Paragraph 25.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the Findings of Fact set forth above, and the Section 106 Administrative Record, U.S. EPA has determined that:

18. The Site is a "facility" as defined by Section 101(9) of CERCLA.

19. Radionuclides, lead, chromium and barium are "hazardous substances" as defined by Section 101(14) of CERCLA.

20. Respondent is a "person" as defined by Section 101(21) of CERCLA.

21. Respondent is a person who may be liable under Section 107(a) of CERCLA and, therefore, subject to an administrative order under Section 106(a) of CERCLA.

22. The conditions described in the Findings of Fact above and the Action Memorandum constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(8) and (22) of CERCLA.

23. The conditions present at the Site constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the NCP. These factors include, but are not limited to, the following:

a. actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; this factor is present at the Site due to the existence of mill tailings in the soils of residential and non-residential properties, including areas which are or may be used for recreation or gardening.

b. high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate; this factor is present at the Site due to the existence of mill tailings in surface and near subsurface soils that may migrate due to wind, erosion, deliberate human movement, or migration of radon/thoron gas from soils into structures.

c. weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; this factor is present at the Site due to the existence of mill tailings in surface and near subsurface soils that may migrate due to wind or erosion.

24. The actual or threatened release of hazardous substances from the Site may present an imminent and substantial endangerment to the public health, welfare, or the environment within the meaning of Section 106(a) of CERCLA.

25. Based on the conditions at the Site and the actual or threatened release of hazardous substances from the Site, U.S. EPA determined in the Action Memorandum that the following removal actions are necessary (more details on the selected removal actions are contained in the Action Memorandum):

- a. excavating contaminated materials from properties at the Site found to exceed the discovery and characterization criteria contained in the Action Criteria Document until levels at or below the verification criteria contained in the Action Criteria Document are reached, including following the "As Low As Reasonably Achievable" principle;
- b. providing additional measures for those limited and exceptional situations that may occur where complete excavation of contaminated soils cannot be accomplished and such measures are needed to reduce exposure and associated risks;

c. minimizing the potential health hazards to workers performing the removal action and to nearby residents during the removal action;

d. backfilling the excavations with clean soil and restoring properties to their original condition or to such other condition as may be arranged with the property owner;

e. using appropriate environmental monitoring during and after removal to verify that cleanup levels are reached and short-term impacts are minimized; and

f. after excavation, transporting all contaminated soils away from affected properties and shipping all contaminated materials removed from affected properties by rail to a licensed permanent disposal facility.

26. The removal actions selected in the Action Memorandum directly address actual or threatened releases of hazardous substances at the Site. Excavation and off-Site disposal of the hazardous substances permanently segregates the contaminated soils from the public and effectively reduces exposure to nearby populations. For certain limited situations where complete excavation of contaminated soils cannot be accomplished, providing additional measures as necessary also reduces exposure to nearby populations.

27. The removal actions required by this Order are necessary to protect the public health, welfare, or the environment, and are not inconsistent with the NCP or CERCLA.

VI. NOTICE TO THE STATE

28. U.S. EPA has notified the IEPA and IDNS that U.S. EPA intends to issue this Order. As U.S. EPA deems appropriate, U.S. EPA will consult with the IEPA and IDNS, and the IEPA and IDNS will have the opportunity to review and comment to U.S. EPA regarding all Work to be performed, including reports, technical data and other deliverables, and any other issues which arise while the Order remains in effect. The IDNS has also been conducting some discovery and characterization activities at the Site for U.S. EPA and will conduct verification activities at the Site in the future, as described in the SOW.

VII. ORDER

29. Based on the foregoing, Respondent is hereby ordered to comply with all of the provisions of this Order, including but not limited to all attachments to this Order, all documents incorporated by reference into this Order, and all schedules and deadlines contained in this Order, attached to this Order, or incorporated by reference into this Order.

VIII. WORK TO BE PERFORMED

30. Within five (5) days after receiving notification from U.S. EPA pursuant to Paragraph II.a. of the SOW that any parcel of property owned by Respondent requires excavation and restoration Work, Respondent shall record notice of and/or a copy of this Order in the appropriate governmental office where land ownership and transfer records are filed or recorded, and shall ensure that the recording of said notice and/or Order is indexed to the title of each and every parcel of property owned by Respondent at the Site, so as to provide notice to third parties of the issuance and terms of this Order with respect to those properties.

Respondent shall, within ten (10) days after such recording and indexing, send notice of such recording and indexing to U.S. EPA.

31. All work plans, reports, engineering design documents, and other deliverables (work plans and deliverables), as described throughout this Order, will be reviewed and either approved, approved with modifications, or disapproved by U.S. EPA. In the event of approval or approval with modifications by U.S. EPA, Respondent shall proceed to take any action required by the work plan, report, or other item, as approved or modified by U.S. EPA. If the work plan or other deliverable is approved with modifications or disapproved, U.S. EPA will provide, in writing, comments or modifications required for approval. Respondent shall amend the work plan or other deliverable to incorporate only those comments or modifications required by U.S. EPA.

Within fourteen (14) days of the date of U.S. EPA's written notification of approval with modifications or disapproval, Respondent shall submit an amended work plan or other deliverable, except that Respondent shall submit any amended monthly schedule required in Paragraph II.2. of the SOW within five (5) days of the date of such notification. U.S. EPA shall review the amended work plan or deliverable and either approve or disapprove it. Failure to submit a work plan, amended work plan or other deliverable within the specified time frame shall constitute noncompliance with this Order. Submission of an amended work plan or other deliverable which fails to incorporate all of U.S. EPA's required modifications, or which includes other unrequested modifications, shall also constitute noncompliance with this Order. Approval by U.S. EPA of the (amended) work plan or other deliverable shall cause said approved (amended) work plan or other deliverable to be incorporated herein as an enforceable part of this Order. If any (amended) work plan or other deliverable is not approved by U.S. EPA, Respondent shall be deemed to be in violation of this Order.

32. In the event of an inconsistency between this Order and any subsequent approved (amended) work plan or other deliverable, the terms of this Order shall control.

33. The Work performed by Respondent pursuant to this Order shall, at a minimum, achieve the performance standards specified

in the Action Criteria Document, the Action Memorandum and the Statement of Work. Nothing in this Order, or in U.S. EPA's approval of any (amended) work plan or other deliverable, shall be deemed to constitute a warranty or representation of any kind by U.S. EPA that full performance of the removal actions required by this Order will achieve the performance standards set forth in the Action Criteria Document, the Action Memorandum and the SOW. Respondent's compliance with such approved documents does not foreclose U.S. EPA from seeking additional Work.

34. All materials removed from the Site shall be disposed of at a facility approved in advance of removal by U.S. EPA's RPM/OSC and in accordance with: 1) § 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3); 2) the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. §§ 6901 to 6992k, as amended; 3) the Procedures for Planning and Implementing Off-Site Response Actions, 58 Fed. Reg. 49,200 (September 22, 1993); and 4) all other applicable federal, State, and local requirements. Respondent shall provide written notice to the RPM/OSC which shall include all relevant information regarding the receiving facility, including the information required by Paragraph 35, before the hazardous substances are actually shipped off-Site.

35. Prior to any off-Site shipment of hazardous substances from the Site to an out-of-state waste management facility, Respondent shall provide written notification to the appropriate state

environmental official in the receiving state and to U.S. EPA's RPM/OSC of such shipment of hazardous substances. However, the notification of shipments to the state shall not apply to any off-Site shipments when the total volume of all shipments from the Site to the state will not exceed ten (10) cubic yards. The notification shall be in writing, and shall include the following information, where available: (1) the name and location of the facility to which the hazardous substances are to be shipped; (2) the type and quantity of the hazardous substances to be shipped; (3) the expected schedule for the shipment of the hazardous substances; and (4) the method of transportation. Respondent shall notify the receiving state of major changes in the shipment plan, such as a decision to ship the hazardous substances to another facility within the same state, or to a facility in another state.

36. Respondent shall cooperate with U.S. EPA in providing to the public information regarding the Work. When requested by U.S. EPA, Respondent shall participate in the preparation of such information for distribution to the public and in public meetings which may be held or sponsored by U.S. EPA to explain activities at or relating to the Site.

37. Within 30 days of the effective date of this Order, Respondent shall submit to U.S. EPA a work plan for the Excavation and Restoration Phase of the non-time-critical removal

actions at the Site described in Paragraph II.b of the SOW ("Work Plan"). Respondent shall develop the Work Plan in conformance with the SOW, the Action Criteria Document, the Action Memorandum, CERCLA and the National Contingency Plan. The Work Plan shall be subject to review, modification, and approval or disapproval by the U.S. EPA, as provided in Paragraph 31.

38. Respondent shall implement the Work detailed in the Work Plan, according to the schedule contained therein, if and when the Work Plan is fully approved by U.S. EPA. Unless otherwise directed by the RPM/OSC, Respondent shall not commence field activities until approval, in writing, by U.S. EPA of the Work Plan. The final, U.S. EPA-approved Work Plan shall be attached to this Order and deemed incorporated into and made an enforceable part of it. All Work shall be conducted in accordance with the Action Criteria Document, Action Memorandum, SOW, National Contingency Plan, CERCLA and the requirements of this Order, including the standards, specifications and schedule contained in the approved Work Plan.

39. Within 60 days after completion of all on-Site Work required under this Order, Respondent shall submit for U.S. EPA review a final report summarizing the actions taken to comply with this Order. The final report shall conform to the requirements set forth in Section 300.165 of the NCP. The final report shall also include a good faith estimate of total costs incurred in

complying with the Order, a listing of quantities and types of materials removed off-Site or handled on-Site, a listing of the ultimate destinations of those materials, a presentation of the analytical results of all sampling and analyses performed by or on behalf of Respondent, and accompanying appendices containing all relevant documentation generated during the removal action (e.g., manifests, invoices, bills, contracts, and permits).

40. The final report shall also include a statement that the on-Site Work has been completed in full satisfaction of the requirements of this Order as well as the following certification of completion signed by a responsible official of Respondent or Respondent's Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If U.S. EPA concludes, following the initial or any subsequent certification of completion by Respondent that the Work has been fully performed in accordance with this Order, U.S. EPA may notify Respondent that the Work has been fully performed. U.S. EPA's notification shall be based on present knowledge and Respondent's certification to U.S. EPA, and shall not limit U.S. EPA's right to perform periodic reviews pursuant to § 121(c) of CERCLA, 42 U.S.C. § 9621(c), or to take or require any action

that in the judgment of U.S. EPA is appropriate at the Site, in accordance with 42 U.S.C. §§ 9604, 9606, or 9607.

IX. ADDITIONAL WORK.

41. In the event that U.S. EPA determines that additional Work or modifications to Work are necessary to meet performance standards, to maintain consistency with this Order or to otherwise protect human health or the environment, U.S. EPA will notify Respondent that additional Work is necessary. U.S. EPA may also require Respondent to modify any plan, design, or other deliverable required by this Order, including any approved modifications.

42. Within thirty (30) days of receipt of notice from U.S. EPA that additional Work is necessary, Respondent shall submit for approval an Additional Work Plan pursuant to Paragraph 31 herein. The Additional Work Plan shall conform to this Order's requirements for the Work Plan. Upon U.S. EPA's approval of the (amended) Additional Work Plan, the (amended) Additional Work Plan shall become an enforceable part of this Order, and Respondent shall implement the (amended) Additional Work Plan for additional Work in accordance with the standards, specifications, and schedule contained therein. Failure to submit an Additional Work Plan within the specified time frame shall constitute noncompliance with this Order.

X. ENDANGERMENT AND EMERGENCY RESPONSE

43. If any event during the performance of the Work causes or threatens to cause a release of a hazardous substance or may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action to prevent, abate, or minimize the threat, and shall immediately notify U.S. EPA's RPM/OSC or alternate RPM/OSC. If neither of these persons is available, Respondent shall notify the U.S. EPA Emergency Response Unit, Region V at 312/353-2318. Respondent shall take further action in consultation with U.S. EPA's RPM/OSC and in accordance with all applicable provisions of this Order, including but not limited to the health and safety plan and the contingency plan. In the event that Respondent fails to take appropriate response action as required by this Paragraph, and U.S. EPA takes that action instead, Respondent shall reimburse U.S. EPA upon written demand for all costs of the response action not inconsistent with the NCP.

44. Nothing in the preceding Paragraph or in any other provision of this Order shall be deemed to limit any authority of the United States to take, direct, or order all appropriate action to protect human health and the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances on, at, or from the Site.

XI. PROGRESS REPORTS

45. In addition to the other deliverables set forth in this Order, Respondent shall provide monthly progress reports to U.S. EPA with respect to actions and activities undertaken pursuant to this Order. The progress reports shall be submitted on or before the 15th day of each month following the effective date of this Order. Respondent's obligation to submit progress reports continues until U.S. EPA gives Respondent written notice under Paragraph 80 of this Order. At a minimum these progress reports shall: (1) describe the actions which have been taken to comply with this Order during the prior month; (2) include all results of sampling and tests and all other data received by Respondent and not previously submitted to U.S. EPA; (3) describe all Work planned for the next forty-five (45) days with schedules relating such Work to the overall project schedule for removal action completion; and (4) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

XII. QUALITY ASSURANCE, SAMPLING AND DATA ANALYSIS

46. Respondent shall use the quality assurance, quality control, and chain of custody procedures described in the "U.S. EPA NEIC Policies and Procedures Manual," May 1978, revised May 1986, U.S. EPA-330/9-78-001-R; U.S. EPA's "Guidelines and Specifications for Preparing Quality Assurance Program Documentation," June 1, 1987;

U.S. EPA's "Data Quality Objective Guidance," (U.S. EPA/540/G87/003 and 004), and any amendments to these documents, while conducting all sample collection and analysis activities related to air monitoring and sampling of backfill material. To provide quality assurance and maintain quality control,

Respondent shall:

a. Prior to the commencement of any sampling and analysis related to air monitoring or sampling of backfill material, submit a Quality Assurance Project Plan (QAPP) to the U.S. EPA that is consistent with Task 2 of the SOW, (amended) work plans, U.S. EPA's "Interim Guidelines and Specifications For Preparing Quality Assurance Project Plans" (QAM-005/80), the U.S. EPA Region V Model QAPP, and any subsequent amendments.

b. Prior to the development and submittal of the QAPP, attend a pre-QAPP meeting sponsored by U.S. EPA to identify all monitoring and data quality objectives. U.S. EPA, after review of the submitted QAPP, will either approve, conditionally approve, or disapprove the QAPP. Upon notification of conditional approval or disapproval, Respondent shall make all required modifications to the QAPP within fourteen (14) days of receipt of such notification.

c. Use only laboratories which have a documented Quality Assurance Program that complies with U.S. EPA guidance document QAMS-005/80 and subsequent amendments.

d. Ensure that the laboratory used by Respondent for analyses, performs according to a method or methods in the approved QAPP.

e. Ensure that U.S. EPA personnel and U.S. EPA's authorized representatives are allowed access to the laboratory and personnel utilized by Respondent for analyses.

47. Respondent shall notify U.S. EPA in advance of any sample collection activity related to air monitoring or sampling of backfill material. At the request of U.S. EPA, Respondent shall allow U.S. EPA or its authorized representatives to take split or duplicate samples of any samples collected by Respondent with regard to air monitoring or sampling of backfill material. In addition, U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary.

XIII. COMPLIANCE WITH APPLICABLE LAWS

48. All actions by Respondent taken pursuant to this Order shall be performed in accordance with the requirements of all applicable federal and State laws and regulations. U.S. EPA has determined that the activities contemplated by this Order are not inconsistent with the National Contingency Plan.

49. Except as provided in § 121(e) of CERCLA and in the NCP, no permit shall be required for any portion of the Work conducted entirely on-Site. Where any portion of the Work, including off-

Site activities necessary for completion of the Work, requires a federal or State permit, Respondent shall submit timely applications and take all other actions necessary to obtain and to comply with all such permits or approvals.

50. This Order is not and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

XIV. REMEDIAL PROJECT MANAGER/ON-SCENE COORDINATOR

51. All communications, whether written or oral, from Respondent to U.S. EPA shall be directed to U.S. EPA's RPM/OSC, unless the RPM/OSC directs Respondent otherwise. Except in emergency situations, communications from Respondent should not be directed to the Alternate RPM/OSC without prior direction from the RPM/OSC. Respondent shall submit to U.S. EPA as many copies of any documents, including plans, reports, and other correspondence, which are developed pursuant to this Order as the RPM/OSC requires, and shall send these documents by certified mail (return receipt requested) or by express mail.

U.S. EPA's Remedial Project Manager is:

Rebecca Frey
Illinois/Indiana Remedial Response Branch
U.S. EPA, Region 5
77 W. Jackson Blvd. (HSRL-6J)
Chicago, Illinois 60604-3590
312/886-4760

U.S. EPA's Alternate RPM/OSC is:

David Seely
Illinois/Indiana Remedial Response Branch
U.S. EPA, Region 5
77 W. Jackson Blvd. (HSRL-6J)
Chicago, Illinois 60604-3590
312/886-7058

52. U.S. EPA may change its RPM/OSC or Alternate RPM/OSC. If U.S. EPA changes its RPM/OSC or Alternate RPM/OSC, U.S. EPA will inform Respondent in writing of the name, address, and telephone number of the new RPM/OSC or Alternate RPM/OSC.

53. U.S. EPA's RPM/OSC and Alternate RPM/OSC shall have the authority lawfully vested in a Remedial Project Manager (RPM) and On-Scene Coordinator (OSC) by the National Contingency Plan. U.S. EPA's RPM/OSC or Alternate RPM/OSC shall have authority, consistent with the NCP, to halt any Work required by this Order, and to take any necessary response action.

XV. PROJECT COORDINATOR AND CONTRACTORS

54. All aspects of the Work to be performed by Respondent pursuant to this Order shall be under the direction and supervision of a Project Coordinator qualified to undertake and complete the requirements of this Order. The Project Coordinator shall be the RPM/OSC's primary point of contact with Respondent and shall possess sufficient technical expertise regarding all aspects of the Work. Within five (5) working days after the effective date of this Order, Respondent shall notify U.S. EPA in

writing of the name and qualifications of the Project Coordinator, including primary support entities and staff, proposed to be used in carrying out the Work. U.S. EPA reserves the right to disapprove the proposed Project Coordinator.

55. Within fourteen (14) days after U.S. EPA approves the Work Plan, Respondent shall identify a proposed construction contractor and notify U.S. EPA in writing of the name, title, and qualifications of the construction contractor proposed to be used in carrying out the Work.

56. Respondent shall submit a copy of the construction contractor solicitation documents to U.S. EPA not later than five (5) days after publishing the solicitation documents. Upon U.S. EPA's request, Respondent shall submit complete copies of all bid packages received from all contract bidders.

57. At least seven (7) days prior to commencing any Work at the Site pursuant to this Order, Respondent shall submit to U.S. EPA a certification that Respondent or its contractors and subcontractors have adequate insurance coverage or have indemnification for liabilities for injuries or damages to persons or property which may result from the activities to be conducted by or on behalf of Respondent pursuant to this Order. Respondent shall ensure that such insurance or indemnification is maintained for the duration of the Work required by this Order.

58. U.S. EPA retains the right to disapprove of the Project Coordinator and any contractor retained by Respondent. In the event U.S. EPA disapproves a Project Coordinator or contractor, Respondent shall retain a new project coordinator or contractor to perform the Work, and such selection shall be made within fifteen (15) days following the date of U.S. EPA's disapproval. If at any time Respondent proposes to use a new project coordinator or contractor, Respondent shall notify U.S. EPA of the identity of the new project coordinator or contractor at least fifteen (15) days before the new project coordinator or contractor performs any Work under this Order.

XVI. SITE ACCESS AND DOCUMENT AVAILABILITY

59. Prior to undertaking its own discovery and characterization activities, U.S. EPA intends to contact property owners in an attempt to obtain access for such activities (described in Paragraph II.a. of the SOW). For those properties owned or in possession of someone other than Respondent for which U.S. EPA has not already requested access to perform discovery and characterization activities, U.S. EPA intends to also request from the property owner permission for Respondent to perform any necessary excavation and restoration Work. If the owner does not grant access for excavation and restoration Work in response to U.S. EPA's letter and such Work is necessary at the property, U.S. EPA will notify Respondent in writing of the owner's denial. Within fourteen (14) calendar days of receipt of such

notification, Respondent shall contact the property owner and request access to perform the excavation and restoration Work. For properties where U.S. EPA has already requested access to perform discovery and characterization activities but did not request access to perform excavation and restoration Work, Respondent shall contact the property owners within fourteen (14) days of receipt of notification from U.S. EPA that the properties require excavation and restoration Work, and request access.

60. In all cases, Respondent shall use its best efforts to obtain a written agreement for access to the property, including providing reasonable compensation in consideration of access. Said agreements shall provide access for U.S. EPA, its contractors and oversight officials, the State and its contractors, and Respondent or Respondent's authorized representatives and contractors. Said agreements shall specify that Respondent is not U.S. EPA's representative with respect to liability associated with Site activities. Copies of such agreements shall be provided to U.S. EPA prior to Respondent's initiation of field activities at those properties. If access agreements are not obtained within the time referenced above, Respondent shall promptly notify U.S. EPA of its failure to obtain access.

61. If Respondent cannot obtain the necessary access agreements, U.S. EPA may exercise non-reviewable discretion to: (1) use its

legal authorities to obtain access for Respondent; (2) conduct response actions at the property in question; or (3) terminate this Order. If U.S. EPA conducts a response action and does not terminate the Order, Respondent shall perform all other removal actions required by this Order that do not require access to that property. Respondent shall integrate the results of any such tasks undertaken by U.S. EPA into its reports and deliverables. Respondent shall reimburse U.S. EPA upon written demand for all response costs (including attorney fees) incurred by the United States to obtain access for Respondent.

62. Respondent shall allow U.S. EPA and its authorized representatives and contractors to enter and freely move about all property at the Site and off-Site areas subject to or affected by the Work under this Order or where documents required to be prepared or maintained by this Order are located, for the purposes of inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to the Site or Respondent and its representatives or contractors pursuant to this Order; reviewing the progress of Respondent in carrying out the terms of this Order; conducting tests as U.S. EPA or its authorized representatives or contractors deem necessary; using a camera, sound recording device or other documentary type equipment; and verifying the data submitted to U.S. EPA by Respondent. Respondent shall allow U.S. EPA and its authorized representatives to enter the Site, to inspect and copy

all records, files, photographs, documents, sampling and monitoring data, and other writings related to Work undertaken in carrying out this Order. Nothing herein shall limit U.S. EPA's right of entry or inspection authority under federal law, and U.S. EPA retains all of its information gathering and enforcement authorities and rights under CERCLA, RCRA, and any other applicable statutes and regulations. .

XVII. RECORD PRESERVATION

63. On or before the effective date of this Order, Respondent shall submit a written certification to U.S. EPA that it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability with regard to the Site since the time of its notification of potential liability by U.S. EPA. Respondent shall not dispose of any such documents without prior approval by U.S. EPA. Within ten (10) days of the effective date of this Order, Respondent shall make all such documents available to U.S. EPA and shall submit a log of any such documents claimed to be privileged for any reason. This privilege log shall list, for each document, the date, author, addressees (including courtesy copies or "cc"s and "bcc"s) and subject matter of the document.

64. Respondent shall provide to U.S. EPA upon request, copies of all documents and information within its or its contractors', subcontractors' or agents' possession or control relating to

activities at the Site or to the implementation of this Order, including but not limited to sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, traffic routing, correspondence, or other documents or information. Respondent shall also make available to U.S. EPA its employees, agents, or representatives for purposes of investigation, information gathering or testimony concerning the performance of the Work.

65. Until ten (10) years after U.S. EPA provides notice pursuant to Paragraph 80 of this Order, Respondent shall preserve, and shall instruct its contractors and agents to preserve, all documents, records, and information of whatever kind, nature or description relating to the performance of the Work. Upon the conclusion of this document retention period, Respondent shall notify the United States at least ninety (90) days prior to the destruction of any such records, documents or information, and, upon request of the United States, Respondent shall deliver all such documents, records and information to U.S. EPA.

66. Respondent may assert a claim of business confidentiality covering part or all of the information submitted to U.S. EPA pursuant to the terms of this Order under 40 C.F.R. § 2.203, provided such claim is not inconsistent with § 104(e)(7) of CERCLA or other provisions of law. This claim shall be asserted in the manner described by 40 C.F.R. § 2.203(b) and substantiated

by Respondent at the time the claim is made. Information determined to be confidential by U.S. EPA will be given the protection specified in 40 C.F.R. Part 2. If no such claim accompanies the information when it is submitted to U.S. EPA, it may be made available to the public by U.S. EPA or the State without further notice to Respondent. Respondent shall not assert confidentiality claims with respect to any data or documents related to Site conditions, sampling, or monitoring. The identification of individual residential properties and their owners shall be kept confidential by Respondent and may be released by Respondent only to the U.S. EPA unless U.S. EPA otherwise agrees in writing. However, Respondent may make use of such data without the written agreement of U.S. EPA in connection with litigation related to the hazardous substances or to the REF, provided that the presiding court deems identification of individual residential properties and their owners necessary.

67. Respondent shall maintain, for the period during which this Order is in effect, an index of documents that Respondent claims contain confidential business information ("CBI"). The index shall contain, for each document, the date, author, addressee, and subject of the document. Respondent shall submit an updated copy of the index to U.S. EPA with each new document(s) claimed to be CBI. The updated index shall also indicate any documents for which CBI claims have been withdrawn.

XVIII. DELAY IN PERFORMANCE

68. Any delay in performance of this Order according to its terms and schedules that U.S. EPA deems is not properly justified by Respondent under the terms of this Section shall be considered a violation of this Order. Any delay in performance of this Order shall not affect Respondent's obligations to fully perform all obligations under the terms and conditions of this Order.

69. Respondent shall notify U.S. EPA of any delay or anticipated delay in performing any requirement of this Order. Such notification shall be made by telephone to U.S. EPA's RPM/OSC or Alternate RPM/OSC within forty-eight (48) hours after Respondent first knew or should have known that a delay might occur. Respondent shall adopt all reasonable measures to avoid or minimize any such delay. Within seven (7) days after notifying U.S. EPA by telephone, Respondent shall provide written notification fully describing the nature of the delay, any justification for delay, any reason why Respondent should not be held strictly accountable for failing to comply with any relevant requirements of this Order, the measures planned and taken to minimize the delay, and a schedule for implementing the measures that will be taken to mitigate the effect of the delay. Increased costs or expenses associated with implementation of the activities called for in this Order is not a justification for any delay in performance.

XIX. UNITED STATES NOT LIABLE

70. The United States and U.S. EPA are not to be construed as parties to, and do not assume any liability for, any contract entered into by Respondent to carry out the activities pursuant to this Order. The proper completion of the Work under this Order is solely the responsibility of Respondent. The United States and U.S. EPA, by issuance of this Order, also assume no liability for any injuries or damages to persons or property resulting from acts or omissions by Respondent, or its directors, officers, employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out any action or activity required by this Order.

XX. ENFORCEMENT AND RESERVATIONS

71. U.S. EPA reserves the right to bring an action against Respondent under § 107 of CERCLA for recovery of any response costs incurred by the United States related to this Order, the Site or any other site at which Respondent may be a liable person. This reservation shall include but not be limited to past costs, direct costs, indirect costs, the costs of oversight, the costs of compiling the cost documentation to support oversight cost demand, as well as accrued interest as provided in § 107(a) of CERCLA.

72. Notwithstanding any other provision of this Order, at any time during the removal actions, U.S. EPA may perform its own

studies, complete the removal actions (or any portion of the removal actions) as provided in CERCLA and the NCP, and seek reimbursement from Respondent for its costs, or seek any other appropriate relief.

73. Should Respondent violate this Order or any provision hereof, EPA may terminate this Order and carry out the required removal actions unilaterally, pursuant to Section 104 of CERCLA, and/or may seek judicial enforcement of this Order pursuant to Section 106 of CERCLA.

74. Nothing in this Order shall preclude U.S. EPA from taking any additional enforcement actions, including modification of this Order or issuance of additional Orders, and/or additional remedial or removal actions as U.S. EPA may deem necessary, or from requiring Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law. This Order shall not affect Respondent's liability under CERCLA § 107(a) for the costs of any such additional actions.

75. Notwithstanding any provision of this Order, the United States hereby retains all of its information gathering, inspection and enforcement authorities and rights under CERCLA, RCRA and any other applicable statutes or regulations.

76. Nothing in this Order shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person for any liability it may have arising out of or relating in any way to the Site.

77. If a court issues an order that invalidates any provision of this Order or finds that Respondent has sufficient cause not to comply with one or more provisions of this Order, Respondent shall remain bound to comply with all provisions of this Order not invalidated by the court's order.

XXI. ACCESS TO ADMINISTRATIVE RECORD

78. The Section 106 Administrative Record is available for review on normal business days between the hours of 9:00 a.m. and 5:00 p.m. at the U.S. EPA, Region V, 77 West Jackson Boulevard Chicago, Illinois. An Index of the Administrative Record is attached hereto as Appendix 1.

XXII. EFFECTIVE DATE AND TERMINATION

79. This Order shall become effective twelve (12) days after the date of issuance.

80. After it receives Respondent's certification of completion under Paragraph 40, U.S. EPA may require such additional activities as may be necessary to complete the Work or U.S. EPA may, based upon such certification and U.S. EPA's concurrent

knowledge, issue written notification to Respondent that the Work has been completed, as appropriate. U.S. EPA's notification shall not limit U.S. EPA's right to take or require any action that in the judgment of U.S. EPA is appropriate at the Site, in accordance with Section 104, 106 or 107 of CERCLA. The provisions of this Order shall be deemed to be satisfied when U.S. EPA notifies Respondent in writing that Respondent has demonstrated, to U.S. EPA's satisfaction, that all terms of the Order have been completed. This notice shall not, however, terminate Respondent's obligation to comply with Section XVII (Record Preservation).

XXIII. NOTICE OF INTENT TO COMPLY

81. On or before the effective date of this Order, Respondent must submit to U.S. EPA a written notice stating its unequivocal intention to comply with all terms of this Order. In the event Respondent fails to provide said written notice of its unequivocal intention to comply with this Order on or before the effective date, Respondent shall be deemed to have refused to comply with this Order. If Respondent fails to provide timely notice of its intent to comply with this Order, it shall thereafter have no authority to perform any response action at the Site, pursuant to §§ 104(a) and 122(e)(6) of CERCLA. In the event Respondent subsequently changes its decision and desires to acquire authority from U.S. EPA under §§ 104(a) and 122(e)(6) of CERCLA to undertake the Work described in this Order, Respondent

must provide the notice described in this Paragraph to U.S. EPA and receive from U.S. EPA written permission and authority to proceed with Work under this Order.

XXIV. PENALTIES

82. Respondent shall be subject to civil penalties under § 106(b) of CERCLA, 42 U.S.C. § 9606(b), of not more than \$25,000 for each day in which Respondent violates, or fails or refuses to comply with this Order without sufficient cause. In addition, failure to properly provide removal action under this Order, or any portion hereof, may result in liability under § 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3), for punitive damages in an amount at least equal to, and not more than three times the amount of any costs incurred by the Fund as a result of such failure to take proper action.

XXV. OPPORTUNITY TO CONFER

83. On or before the effective date of this Order, Respondent may submit written comments to U.S. EPA. If Respondent asserts a "sufficient cause" defense under § 106(b) of CERCLA, Respondent shall describe the nature of any "sufficient cause" defense using facts that exist on or prior to the effective date of this Order. The absence of a response by U.S. EPA shall not be deemed to be acceptance of Respondent's assertions.

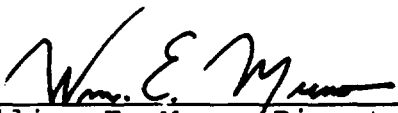
84. Within five (5) days after the date of issuance of this Order, Respondent may request a conference with the U.S. EPA to discuss this Order. If requested, the conference shall occur with 12 (twelve) days of the date of issuance of this Order, at the office of U.S. EPA, Region 5, in Chicago, Illinois.

85. The purpose and scope of the conference shall be limited to issues involving the implementation of the Work and the extent to which Respondent intends to comply with this Order. This conference is not an evidentiary hearing and does not constitute a proceeding to challenge this Order. It does not give Respondent a right to seek review of this Order or to seek resolution of potential liability. No record of the conference (e.g. stenographic, tape or other physical record) will be made. At any conference held pursuant to Respondent's request, Respondent may appear in person or by an attorney or other representative. Requests for a conference must be by telephone followed by written confirmation to U.S. EPA's RPM/OSC.

ADMINISTRATIVE ORDER FOR KERR-McGEE RESIDENTIAL AREAS REMOVAL
SITE

So Ordered, this 18th day of November, 1994.

BY:



William E. Muno, Director
Waste Management Division
U.S. Environmental Protection Agency, Region V

APPENDIX 1

INDEX TO SECTION 106 ADMINISTRATIVE RECORD

1. Action Memorandum for Site, November 1994
2. Engineering Evaluation/Cost Analysis for Site, August 1994
3. Action Criteria Document for Site, November 1993

Attachment to Unilateral Administrative Order

**STATEMENT OF WORK FOR
NON-TIME-CRITICAL REMOVAL ACTIONS
AT THE
KERR-McGEE RESIDENTIAL AREAS REMOVAL SITE
WEST CHICAGO, ILLINOIS**

I. PURPOSE

The purpose of this Statement of Work ("SOW") is to set forth the requirements for implementation of non-time-critical removal actions at the Kerr-McGee Residential Areas Removal Site ("Site"). Respondent shall implement all Work described in this SOW in accordance with the Order to which this SOW is attached, the Action Criteria Document and the Action Memorandum. In the event of any inconsistency between this SOW and the Order, the Order shall govern.

II. DESCRIPTION OF THE NON-TIME-CRITICAL REMOVAL ACTIONS TO BE CONDUCTED BY RESPONDENT

The activities associated with the non-time-critical removal actions are being conducted in three concurrent phases. Respondent shall conduct one phase of the activities, as generally described in Paragraph II.b. below. U.S. EPA and/or IDNS will conduct other phases of the activities, as generally described in paragraphs II.a. and c. below.

- a. DISCOVERY AND CHARACTERIZATION PHASE:** During this phase, U.S. EPA will survey, sample and test properties in the West Chicago area to determine which properties exceed the Discovery and Characterization Criteria contained in the Action Criteria Document. Based on the results of those surveys, samples and tests, U.S. EPA will identify properties that exceed the Discovery and Characterization Criteria and, therefore, require Excavation and Restoration Phase Work. U.S. EPA will notify Respondent which properties U.S. EPA determines require Excavation and Restoration Phase Work. The notification U.S. EPA provides to Respondent may be in either hard copy or electronic format and will include appropriate information about the properties that U.S. EPA gathers during this phase. Within 30 days of the effective date of the Order, U.S. EPA will provide to Respondent an initial list of properties that U.S. EPA has determined require Excavation and Restoration Phase Work. Thereafter, U.S. EPA will provide such notification to Respondent on a routine basis as discovery/characterization activities continue.

- b. **EXCAVATION AND RESTORATION PHASE:** During this phase, Respondent shall remove contaminated materials from each property that U.S. EPA determines exceeds the Discovery and Characterization Criteria and notifies Respondent pursuant to Paragraph II.a. requires Excavation and Restoration Phase Work. As used in this SOW, "contaminated materials" means soils that exceed the Discovery and Characterization Criteria and any other materials (e.g., concrete or wood) that have become contaminated with hazardous substances as a result of the thorium mill tailings at the Site. Respondent shall excavate contaminated materials from each such property to levels that meet the Verification Criteria contained in the Action Criteria Document. Prior to backfilling any excavated area with clean soil, Respondent shall notify U.S. EPA that Respondent believes the Verification Criteria have been met at that area. U.S. EPA/IDNS then will conduct verification activities (described below) to confirm that Respondent has met the Verification Criteria. If U.S. EPA, in consultation with IDNS, determines that the Verification Criteria have not been met, Respondent shall conduct additional excavations as necessary to meet the Verification Criteria. If U.S. EPA, in consultation with IDNS, determines that the Verification Criteria have been met at any excavated area, U.S. EPA shall so notify Respondent, and Respondent shall backfill the excavation with clean soils and shall restore the property, to the extent practicable, to its original condition or such other condition as the property owner may have approved in writing.
- c. **VERIFICATION PHASE:** During this phase, U.S. EPA/IDNS will conduct sampling, surveying and testing activities to determine whether the Verification Criteria have been met at all properties undergoing the Excavation and Restoration Phase Work. U.S. EPA/IDNS will conduct this phase of the project at each such property: 1) after excavation Work but before backfilling and restoration Work, i.e., after Respondent notifies U.S. EPA that it believes it has met the Verification Criteria; and 2) after backfilling of the excavation. For the verification activities that occur in the open excavation, U.S. EPA will notify Respondent whether the Verification Criteria have been met so the excavation may be backfilled and the property restored.

A more detailed description of the Work to be conducted by Respondent during the Excavation and Restoration Phase is provided below:

1. Access Agreements

Respondent shall obtain access agreements to areas of the Site not under its control as provided in Section XVI of the Order (Site Access and Document Availability). In order to minimize disputes regarding future restoration of the property, prior to any excavation, Respondent shall document the existing physical conditions of the property by photographs or video recordings.

2. Excavation of Properties

As stated above in Paragraph II.a., U.S. EPA will provide to Respondent within 30 days of the effective date of the Order an initial list of properties that require Excavation and Restoration Phase Work, and shall thereafter provide such notification to Respondent on a routine basis as discovery/characterization activities continue. The initial list of properties (hereinafter known as the "Initial List") shall consist of properties that have not been the subject of cleanup activities by Respondent in the mid-1980s.

U.S. EPA recognizes that it is not possible to undertake any excavation or restoration activities during the winter months (December through March) and that weather conditions may affect excavation or restoration activities at other times of the year. In addition, U.S. EPA recognizes that discoveries during the conduct of excavations, the need to obtain applicable off-Site licenses, permits and authorizations or unanticipated difficulties in the conduct of excavations may affect the schedule for the Work. As a result, the time schedules for the conduct of excavation or restoration Work may be subject to adjustment by U.S. EPA to reflect weather, scheduling or other appropriate considerations. Respondent shall provide notice to U.S. EPA of the need for any such adjustment and U.S. EPA may, at its discretion, adjust the schedule if U.S. EPA determines that such adjustment is appropriate.

Within 21 days after U.S. EPA's approval of Respondent's Excavation and Restoration Phase Work Plan ("Work Plan") (described in Section III of this SOW and Paragraph 38 of the Order), Respondent shall begin excavation Work at some or all of the properties that U.S. EPA has notified Respondent require excavation and restoration Work and that are included in the Initial List. For additional properties subsequently identified by U.S. EPA as needing excavation and restoration Work, Respondent shall begin excavation Work at such properties in accordance with the monthly schedule (described below) as approved by U.S. EPA. All excavation Work shall be conducted to meet the Verification Criteria using such procedures and equipment as necessary and appropriate and as described in the

approved Work Plan. Respondent shall supply adequate staffing of excavation crews to ensure that Work at each affected property and at the Site as a whole is conducted without unnecessary delay, as determined by U.S. EPA.

On the 15th day of each month, as part of the monthly written progress report described in Section XI of the Order (Progress Reports), Respondent shall submit a monthly schedule containing a list of the properties scheduled to be excavated and the proposed level of staffing of work crews in the following 45 days. U.S. EPA will approve, approve with modifications or disapprove the schedule in accordance with Paragraph 32 of the Order and Respondent shall amend the schedule accordingly within 5 business days of receipt of the modifications. The approved schedule shall become an enforceable part of the Order.

As a general rule, Respondent shall provide in the monthly schedule for excavations at properties on a block-by-block or neighborhood-by-neighborhood basis (which is how U.S. EPA intends to conduct the Discovery and Characterization Phase) in order to minimize the number of times excavation crews must visit any one area of the Site. During its review of the monthly schedules, U.S. EPA may re-prioritize certain properties in accordance with U.S. EPA's "worst sites first" philosophy. Respondent shall conduct excavations at the properties in the order of precedence established in the approved schedule.

When Respondent believes, after conducting excavation Work, that it has met the Verification Criteria at a property, it shall immediately notify U.S. EPA in accordance with the procedures established in the approved Work Plan and provide any documentation supporting this belief. After receiving such notice, U.S. EPA/IDNS will conduct Verification Phase sampling, surveying and testing at that property. If U.S. EPA, in consultation with IDNS, determines that the Verification Criteria have not been met, Respondent shall conduct additional excavation Work as necessary to meet the Verification Criteria and again notify U.S. EPA that it believes it has met the Verification Criteria. If U.S. EPA, in consultation with IDNS, determines that the Verification Criteria have been met, U.S. EPA shall so notify Respondent, and Respondent shall commence restoration of the property.

3. Restoration of Properties

After U.S. EPA has notified Respondent that Respondent has met the Verification Criteria at a property based on U.S. EPA/IDNS surveys, samples and tests in the open excavation, Respondent shall begin restoration of the property as promptly as is practicable, but no later than 7 days after the receipt of such

notice. Respondent shall complete restoration of the property as expeditiously as practicable. Respondent shall use clean soils to backfill the areas from which contaminated materials have been excavated, and shall re-establish previous contours. Excavated and/or disturbed areas shall be restored, to the extent practicable, to original conditions or such other conditions as the owner of the property may approve in writing. Sod or grass seed shall be used for areas that were grass-covered prior to excavation and Respondent shall replace any vegetation that has been removed with appropriate nursery stock.

After restoration of a property, Respondent shall use its best efforts to obtain written acceptance of the restoration Work from the property owner, showing that the property owner agrees that Respondent has fulfilled its agreement to restore the property. In the event that Respondent and the property owner cannot reach an agreement that the property has been properly restored, the U.S. EPA Remedial Project Manager/On-Scene Coordinator ("RPM/OSC") shall resolve the dispute. Respondent shall promptly take any actions the U.S. EPA RPM/OSC deems necessary to restore the property.

Respondent shall supply adequate staffing of restoration crews to ensure that Work at each property and at the Site as a whole is conducted without unnecessary delay, as determined by U.S. EPA.

4. Handling, Transportation and Disposal of Excavated Materials

The contaminated materials at this Site have been classified as "11(e)(2) byproduct material" as defined by the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2014(e)(2). Immediately after excavation Work at any property, Respondent shall transport all contaminated materials away from the Site to a facility licensed to accept 11(e)(2) byproduct material, in accordance with the procedures in the approved Work Plan.

Respondent shall arrange for the disposal of all contaminated materials removed from affected properties pursuant to this SOW at a permanent disposal facility licensed to accept and permanently dispose of 11(e)(2) byproduct material.

Respondent shall keep track of all materials excavated or removed from the Site by keeping a log of all activities on a property-by-property and project-wide basis. Such information shall include, at a minimum, dates of excavation and volumes of materials excavated from affected properties, dates and volumes of materials handled and transported away from such properties, and dates and volumes of materials transported to the licensed permanent disposal facility or facilities. Such information shall be transmitted to U.S. EPA in electronic format suitable

for incorporation into U.S. EPA's electronic database for this Site.

5. Dust Control Measures and Air Monitoring

During all excavation, restoration, transportation and associated materials-handling Work, Respondent shall implement dust control measures to minimize the occurrence of dust and/or contaminated soil from becoming airborne. Respondent shall conduct monitoring near excavation locations to provide both for worker protection and protection of the general public from contaminated dust and radon/thoron emissions. Respondent shall include in the Work Plan a detailed description of the dust control measures and monitoring that will be conducted during the Excavation and Restoration Phase.

III. SCOPING AND PLANNING DOCUMENTS FOR REMOVAL ACTION

Respondent shall prepare and submit to U.S. EPA for review and approval as provided in Paragraph 32 of the Order the scoping and planning documents described below. The approved documents will become enforceable parts of the Order. The documents shall describe in detail the steps to be taken to implement the design, construction, operation and maintenance of the Excavation and Restoration Phase at the Site. Respondent is responsible for the timely implementation of the Excavation and Restoration Phase Work in accordance with the U.S. EPA-approved plans. The schedule for submittal of the documents is described in Section IV of this SOW.

Task 1: Excavation and Restoration Phase Work Plan

Subtask A: Dust Control Plan

Subtask B: Air Monitoring Plan

**Subtask C: Permitting and Access Requirement
Plan**

Subtask D: Traffic Control Plan

Subtask E: Site Security Plan

**Subtask F: Pre-Verification Screening Sampling
Plan**

**Task 2: Quality Assurance Project Plan and Field Sampling
Plan**

Task 3: Construction Quality Assurance Plan

Task 4: Health and Safety Plan

Task 5: Emergency Contingency Plan

Task 6: Preconstruction Meeting and Routine Progress Meetings

Task 1: Excavation and Restoration Phase Work Plan

Respondent shall submit a Work Plan for U.S. EPA review and approval in accordance with Section VIII of the Order (Work to be Performed), and in accordance with the schedule in Section IV of this SOW. The Work Plan shall document and detail the overall scope and management strategy for performing the design, construction, operation, maintenance and monitoring of the Excavation and Restoration Phase Work. The Work Plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation of the Excavation and Restoration Phase Work and shall include a description of qualifications of key personnel directing the activities, including key contractor personnel and leaders of the excavation/restoration work crews. The Work Plan shall describe in detail the equipment, procedures and materials that may be used during all phases of the Excavation and Restoration Phase Work (including excavation, restoration, materials handling and transportation), including identification of the source and physical characteristics of the soil that will be used as backfill to restore properties. U.S. EPA recognizes that such details as the number of days per week and the hours each day when excavation/restoration Work will be conducted, the number of excavation/restoration crews to be used and the number of people per crew cannot be specified until the extent of excavation/restoration Work to be conducted is known. The Work Plan shall describe the notification procedures to be used to notify U.S. EPA when Respondent believes, after excavation but before backfilling, that it has met the Verification Criteria at properties designated for excavation and restoration Work. In addition, the Work Plan shall describe the data collected and recorded by Respondent in connection with the Excavation and Restoration Phase Work and the procedures for transferring that information to U.S. EPA as that Work progresses. If at all possible, such information shall be transmitted to U.S. EPA in electronic format suitable for incorporation into U.S. EPA's electronic database for this Site. The Work Plan also shall contain a schedule for the Excavation and Restoration Phase Work, although U.S. EPA recognizes that some aspects of the schedule are dependent on the extent of excavation/restoration to be conducted, which for the project as a whole is unknown at this time.

In addition to addressing the above-listed items, the Work Plan shall contain detailed descriptions of the plans for the subtasks listed below:

Subtask A: Dust Control Plan

Respondent shall submit a Dust Control Plan which shall describe in detail, at a minimum, the methods to be employed during all phases of the Excavation and Restoration Phase (including excavation, restoration, transportation and associated materials handling Work) to minimize the occurrence of dust and/or contaminated soil from becoming airborne, and the corrective measures to be implemented in the event that excessive dust and/or contaminated soil becomes airborne. If water is used as a dust control measure, the plan shall describe the procedures that will be used to control or contain runoff.

Subtask B: Air Monitoring Plan

Respondent shall submit an Air Monitoring Plan which shall describe in detail, at a minimum, the methods to be used to conduct air monitoring around the excavation locations. Monitoring near excavation locations shall be conducted as necessary to ensure that excessive airborne contaminated dust and radon/thoron is not being released. Monitoring shall be conducted both within restricted excavation areas (for worker protection) and at the perimeter of and/or outside restricted areas (for protection of the general public).

Subtask C: Permitting and Access Requirement Plan

Respondent shall submit a plan which shall outline and include, at a minimum, a comprehensive list of all permits required in conjunction with the Excavation and Restoration Phase Work, procedures and estimated time frames for acquiring required permits, procedures and methods to be implemented to ensure compliance with permitting requirements, and procedures and methods to be implemented to obtain access and to follow up when access is not obtained. The plan also shall describe the procedures to be used to ensure that buried underground utilities are not damaged during removal activities, and corrective measures to be taken in the event that such damage occurs.

Subtask D: Traffic Control Plan

Respondent shall submit a plan which shall describe the procedures to be used to control traffic in the event that

excavation/restoration Work must be conducted on or near roadways or sidewalks.

Subtask E: Site Security Plan

Respondent shall submit a plan which shall describe in detail the procedures that shall be used to prevent access from the general public to areas where excavation/restoration Work is being conducted, including those times when an excavation is left open during periods of no on-Site activity.

Subtask F: Pre-Verification Screening Sampling Plan

Respondent shall submit a plan which shall describe in detail the field methods, sampling procedures and analytical methods that Respondent will use during excavation activities, prior to the verification activities that will be conducted by U.S. EPA/IDNS, to determine when Respondent believes it has met the Verification Criteria at a property. The plan shall contain sufficient information to ensure that, if Respondent follows such methods and procedures, U.S. EPA/IDNS verification activities will indeed confirm that the Verification Criteria have been met. (Note that this plan is not a Quality Assurance Project Plan.) Respondent shall use adequate field and laboratory instruments, in up-to-date calibration and good working order, to perform the pre-verification screening sampling.

Task 2: Quality Assurance Project Plan and Field Sampling Plan

Respondent shall develop a Quality Assurance Project Plan (QAPP) and a Field Sampling Plan (FSP) for the following limited aspects of the Work:

- 1) Air monitoring activities; and
- 2) Sampling of backfill material to ensure that the material used to restore excavated properties is clean, meaning that the radiological and chemical composition of the backfill material must be within background ranges for the Site as established by U.S. EPA during the first phase of the discovery/characterization fieldwork.

The FSP shall supplement the QAPP and shall address all sample collection activities associated with the above-listed aspects of the Work.

Respondent shall attend a pre-QAPP meeting with U.S. EPA prior to preparation of the QAPP. The QAPP shall address all sample analysis and data handling for the above-listed aspects of the work, and shall be prepared in accordance with the U.S. EPA Region 5 model QAPP. The QAPP shall at a minimum include:

Project Description

- * Facility Location History
- * Past Data Collection Activity
- * Project Scope
- * Sample Network Design
- * Parameters to be Tested and Frequency
- * Project Schedule

Project Organization and Responsibility

Quality Assurance Objectives for Measurement Data

- * Level of Quality Control Effort
- * Accuracy, Precision and Sensitivity of Analysis
- * Completeness, Representativeness and Comparability

Sampling Procedures

Sample Custody

- * Field Specific Custody Procedures
- * Laboratory Chain of Custody Procedures

Calibration Procedures and Frequency

- * Field Instruments/Equipment
- * Laboratory Instruments

Analytical Procedures

- * Non-Contract Laboratory Program Analytical Methods
- * Field Screening and Analytical Protocol
- * Laboratory Procedures

Internal Quality Control Checks

- * Field Measurements
- * Laboratory Analysis

Data Reduction, Validation and Reporting

- * Data Reduction
- * Data Validation
- * Data Reporting

Performance and System Audits

- * Internal Audits of Field Activity

- * Internal Laboratory Audit
- * External Field Audit
- * External Laboratory Audit

Preventive Maintenance

- * Routine Preventive Maintenance Procedures and Schedules
- * Field Instruments/Equipment
- * Laboratory Instruments

Specific Routine Procedures to Assess Data Precision, Accuracy and Completeness

- * Field Measurement Data
- * Laboratory Data

Corrective Action

- * Sample Collection/Field Measurement
- * Laboratory Analysis

Quality Assurance Reports to Management

Task 3: Construction Quality Assurance Plan

Respondent shall submit a Construction Quality Assurance (CQA) Plan which describes the Site-specific components of the quality assurance program that Respondent will use to ensure that the physical characteristics of the soil being used as backfill material are appropriate for the intended use of the area (e.g., can support structures) and that backfilled areas will maintain their contours over the long term (i.e., backfilled areas will not settle).

The CQA Plan shall describe the qualifications of the CQA officer and supporting inspection personnel to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities. The CQA Plan also shall describe the proposed quality assurance sampling activities that will be used to monitor the construction, including the scope and frequency of each type of sampling activity, acceptance and rejection data sheets, and all associated documentation. Reporting requirements for CQA activities shall be described in detail in the CQA Plan, as well as provisions for the final storage of all records and documentation.

Task 4: Health and Safety Plan

Respondent shall develop a Health and Safety Plan which is designed to protect on-Site personnel and area residents from physical, chemical, radiological and all other hazards

posed by excavation and restoration Work. Respondent shall designate a Health Physicist as a Health and Safety officer to ensure that all Work associated with such excavation and restoration is conducted in a manner protective to the workers and local residents. The Health and Safety officer shall be responsible for ensuring that the Health and Safety Plan is followed by all employees and contractors of Respondent. The Health and Safety Plan shall develop the performance levels and specifications necessary to address the following areas:

- Site Description
- Personnel
- Levels of Protection
- Safe work practices and safeguards
- Concepts and methodologies to be followed by workers to keep radiation doses "As Low As Reasonably Achievable" (ALARA)
- Procedures for weather-related problems (such as hypothermia, heat stress and heat exhaustion)
- Special training required for work crews and on-site personnel
- Medical surveillance
- Personal and environmental air monitoring
- Personal protective equipment
- Personal hygiene
- Decontamination - personal and equipment
- Site work zones and access control
- Contaminant control
- Procedures for conducting equipment release surveys and specification of release criteria
- Contingency and emergency planning
- Logs, reports and record keeping

The Health and Safety Plan shall follow U.S. EPA guidance and all OSHA requirements as outlined in 29 CFR 1910 and 1926.

Task 5: Emergency Contingency Plan

Respondent shall submit an Emergency Contingency Plan describing procedures to be used in the event of an accident or emergency at the Site. The Emergency Contingency Plan shall contain, at a minimum, the following:

1. Name of the person or entity responsible for responding in the event of an emergency incident.
2. Plan for meeting(s) with the local community, including local, State and Federal agencies involved in the

cleanup, as well as local police, fire, utility and emergency personnel and hospitals.

3. First aid medical information.
4. Air Monitoring Plan
5. Spill Prevention, Control, and Countermeasures (SPCC) Plan, as specified in 40 CFR Part 109, describing measures to prevent and contingency plans for potential spills and discharges from materials handling and transportation.

Task 6: Preconstruction Meeting and Routine Progress Meetings

A. PRECONSTRUCTION MEETING

Before excavation Work pursuant to this SOW may commence, Respondent shall participate with the U.S. EPA and IDNS in a preconstruction meeting to:

- 1) Review methods for documenting and reporting data collected during the removal action;
- 2) Review lines of communication and methods to be used by Respondent to keep U.S. EPA and IDNS apprised of status of Work and notify U.S. EPA when Respondent believes it has met the Verification Criteria at a property;
- 3) Review methods for distributing and storing documents and reports;
- 4) Review work area security, safety protocol and the Health and Safety and Emergency Contingency Plans;
- 5) Discuss any appropriate modifications to the Quality Assurance Project Plan and/or Construction Quality Assurance Plan to ensure that Site-specific considerations are addressed;
- 6) Review excavation methods, dust control measures, air monitoring methods, materials handling and transportation methods, equipment storage locations, and any other procedures relevant to implementation of the removal action;
- 7) Review instrument calibration methods, calibration frequencies, cross-checks at regular intervals and with U.S. EPA/IDNS instrumentation, and air monitor flow

checks to assure data quality and confirm agreement between instruments; and

8) Revise schedules and sequence of activities as necessary.

B. ROUTINE PROGRESS MEETINGS

After excavation/restoration Work begins, Respondent shall participate in routine progress meetings with U.S. EPA and IDNS on a monthly basis or more frequently as determined by U.S. EPA. All of the items listed under item A above shall be reviewed and updated if necessary. Problems encountered or anticipated and solutions implemented or planned shall be discussed.

IV. SUMMARY OF MAJOR DELIVERABLES/SCHEDULE

A summary of the project schedule and reporting requirements contained in this SOW is presented below.

<u>Submission/Event</u>	<u>Due Date</u>
1. Excavation and Restoration Phase Work Plan	Thirty (30) days after effective date of Order
2. QAPP/FSP	Thirty (30) days after effective date of Order
3. CQA Plan	Thirty (30) days after effective date of Order
4. Health and Safety Plan	Thirty (30) days after effective date of Order
5. Emergency Contingency Plan	Thirty (30) days after effective date of Order
6. Submit revised plans (see Section VIII of Order)	Within fourteen (14) days of receipt of U.S. EPA disapproval/comments

- | | |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 7. Obtain access to properties (see Section XVI of Order) | Contact property owner within fourteen (14) days of notification from U.S. EPA |
| 8. Preconstruction Meeting | Prior to any excavation work |
| 9. Begin excavation activities (see Section II.2. of this SOW) | Within twenty-one (21) days after U.S. EPA approval of Work Plan |
| 10. Transport excavated materials away from properties | Immediately after excavation |
| 11. Begin restoration activities at individual properties | Within seven (7) days of receipt of U.S. EPA notification that Verification Criteria met |
| 12. Complete restoration activities at individual properties | As expeditiously as practicable |
| 13. Monthly Written Progress Reports (see Section XI of Order) | Within fifteen (15) days of end of preceding month |
| 14. Routine Progress Meetings | Monthly after preconstruction meeting, or more frequently as determined by U.S. EPA |
| 15. Complete excavation/restoration Work at the site | Without unnecessary delay |
| 16. Submit Final Report (see Section VIII of Order) | Sixty (60) days after completion of all on-Site Work |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

MEMORANDUM

DATE: NOV 18 1994

SUBJECT: **ACTION MEMORANDUM** - Determination of Threat to Public Health or Welfare or the Environment at the Kerr-McGee Residential Areas Site and Portions of the Kress Creek/West Branch of DuPage River Site, DuPage County, Illinois (Residential Areas Site ID #QV, Kress Creek Site ID #QS)

FROM: Rebecca Frey *RFrey*
Remedial Project Manager/On-Scene Coordinator

TO: Valdas V. Adamkus
Regional Administrator

THRU: William E. Muno, Director *WEM*
Waste Management Division

I. PURPOSE

The purpose of this Action Memorandum (or "Action Memo") is to document the determination of an imminent and substantial threat to public health or welfare or the environment posed by the presence of contaminated soils at the Kerr-McGee Residential Areas Site and residential portions of the Kress Creek/West Branch of DuPage River Site ("Kress Creek Site"), DuPage County, Illinois, and to document approval of the proposed non-time-critical removal action described herein.

The proposed removal action seeks to mitigate the imminent and substantial threat to human health and the environment posed by the presence of uncontrolled hazardous substances at the Sites, both of which are on the National Priorities List ("NPL"). The removal action involves excavating contaminated soils from contaminated properties, backfilling and restoring the properties, and disposing of the soils at a licensed permanent off-site disposal facility. Properties that will undergo removal action include: (1) those properties at the Kerr-McGee Residential Areas NPL Site at which mill tailings from the Kerr-McGee West Chicago Rare Earths Facility ("REF") have come to be located outdoors and at which EPA determines exceed established cleanup criteria, and (2) floodplain soils at residential properties along the Kress Creek NPL Site at which mill tailings from the REF have come to be located outdoors and at which EPA

determines exceed established cleanup criteria. For purposes of this Action Memo, these properties will collectively be referred to as the Kerr-McGee Residential Areas Removal Site. The removal action is expected to be conducted by Kerr-McGee Chemical Corporation, a potentially responsible party ("PRP").

II. SITE CONDITIONS AND BACKGROUND

Residential Areas Site: CERCLIS ID #ILD980824015.

Kress Creek Site: CERCLIS ID #ILD980823991.

This is a non-time-critical removal action.

The Kerr-McGee Residential Areas NPL Site is located in and around the City of West Chicago, in DuPage County, Illinois, approximately 30 miles west of Chicago, Illinois. The Site encompasses not only residential properties, but also institutional, commercial, municipal and other properties that became contaminated by thorium mill tailings from the REF. The mill tailings contain radionuclides and heavy metals. The properties became contaminated primarily because thorium mill tailings from the REF were used as fill or spilled while being transported elsewhere, although some of the properties may have become contaminated due to windblown material from the REF. The exact number of contaminated properties is unknown at this time, but will be determined by EPA through fund-lead remedial activities that already are underway. Approximately 1500 properties are included in EPA's study area for the Residential Areas NPL Site.

The Kress Creek NPL Site is located south of the City of West Chicago, in unincorporated DuPage County. The Kress Creek Site became contaminated as a result of surface drainage and possibly direct discharges which travelled from the REF through a storm sewer and into the creek. It consists of contaminated sediments in the bed and banks of Kress Creek and the West Branch of the DuPage River (downstream of its confluence with Kress Creek), as well as floodplain soils which became contaminated as a result of flooding and deposition of contaminated sediments over the years. The Kress Creek NPL Site passes through portions of EPA's study area for the Residential Areas NPL Site, as well as through open lands and heavily wooded areas. Some residential properties extend into the floodplain of the Kress Creek Site, and exhibit elevated radiation levels. As described in Section I of this Action Memo, the only portions of the Kress Creek Site addressed in this Action Memo are those portions of the floodplain (not the bed or banks of the creek and river) that are actual residential properties. Specifically, such residential properties are located in the areas numbered 1 and 2 on the map shown in Attachment 2.

The Residential Areas NPL Site and the Kress Creek NPL Site are two of four Kerr-McGee NPL sites in the West Chicago area. The

other two NPL sites, Reed-Keppler Park and the Sewage Treatment Plant, are not addressed by this action. The REF, which is the source of the contamination at all four NPL sites, is not listed on the NPL, but is undergoing cleanup, closure and decommissioning activities under the regulatory authority of the Illinois Department of Nuclear Safety ("IDNS").

From approximately 1932 to 1973, the facility that is now known as the REF was operated by three different companies to extract thorium and other elements from various ores. The facility began operation in 1932, when the Lindsay Light and Chemical Company began producing thorium and other rare earth materials. In 1958, the Lindsay Light and Chemical Company merged into the American Potash & Chemical Company, and in 1967, as part of a larger corporate merger, the Kerr-McGee Chemical Corporation ("Kerr-McGee") acquired the facility. Kerr-McGee maintained operations at the facility until its closure in 1973. When it was operating, the facility reportedly was the largest producer of rare earth and thorium compounds in the world.

Production of thorium, a radioactive material, yielded radioactive mill tailings primarily containing thorium and residual levels of radium and some uranium. These tailings were stockpiled at the REF, and during the early years of operation of the REF (1930's into the 1950's and possibly later), were available for use as fill material at residential and other properties throughout the area. The tailings were also disposed of at Reed-Keppler Park and the Sewage Treatment Plant. During transportation to these sites, some tailings spilled along the route. In addition, the materials stockpiled at the REF also may have been subject to wind dispersal. As a result, the soils at numerous properties throughout the area became contaminated. Other contaminants, contained in surface runoff and possibly direct plant discharges, travelled via a storm sewer to Kress Creek. In 1954, thorium production became subject to federal regulation with the passage of the Atomic Energy Act, implemented by the U.S. Atomic Energy Commission ("AEC"). A license to operate the REF was granted in 1956 to Lindsay Light and Chemical Company and subsequently transferred with REF ownership to Kerr-McGee via its acquisition of American Potash in 1967. In 1974, under the Energy Reorganization Act, the AEC was abolished and its licensing and regulatory authority was transferred to the U.S. Nuclear Regulatory Commission ("NRC"). The State of Illinois petitioned NRC for amendment of the agreement-state licensing program to include licensing control of REF material (categorized as 11(e)(2) by-product material as defined by the Atomic Energy Act), and IDNS was granted licensing authority on November 1, 1990.

The initial base study to identify and briefly characterize contaminated properties outside the REF was conducted from March 1976 to May 1978 by Argonne National Laboratory ("ANL") for the

NRC. This study, conducted by Frigerio et al., identified 77 thorium-processing waste deposits in the area (the main body of the report identified 75 areas, and an appendix identified an additional 2 areas); the locations included Reed-Keppler Park, the Sewage Treatment Plant, and Kress Creek, but also properties located to the east of the REF and other locations outside of the City limits. Techniques used to delineate the contaminated areas included an Aerial Radiological Monitoring Survey ("ARMS") flyover in 1977, a street-by-street instrumented vehicle survey, an external gamma exposure rate survey, soil contamination measurements using subsurface sampling, and a radiological walkover survey along the waterways and banks of Kress Creek and parts of the West Branch of the DuPage River. (The report of this study, entitled "Thorium Residuals in West Chicago, Illinois," is included in the Administrative Record, the index of which is attached to this Action Memo as Attachment 1.)

Around 1981, the NRC reported on external gamma exposure rates at the REF fenceline and surrounding residential neighborhoods, and indicated that exposure rates were the result of both on-REF and off-REF sources; however, the relative contribution of each was not established.

In 1981, Oak Ridge Associated Universities ("ORAU"), led by P.W. Frame, conducted a study of Kress Creek for the NRC as a followup to the early study by Frigerio, et al. The study included analysis of sediment samples from the creek bed and surface soil samples within several meters of the edge of the creek. The report of this study, entitled "Radiological Survey of Kress Creek, West Chicago, Illinois," is included in the Administrative Record (see index, Attachment 1).

Around 1983, ANL conducted indoor radon measurements for EPA in 10 homes in West Chicago. The indoor radon levels in the homes that were tested were generally less than 0.02 Working Levels ("WL") in living areas. (0.02 WL is one of the criteria being used by EPA in current efforts to identify contaminated properties, and also is one of the criteria that will be used to verify proper remediation of properties.)

In 1982 and 1983, ORAU conducted another study of Kress Creek for the NRC as a followup to the 1981 study. The study, again led by P.W. Frame, was much more comprehensive than the first, with the intent of determining not only the direct radiation levels, but also the depth distribution of contamination in the creek and river beds and in bank soil along the creek and river. The 1984 report, entitled "Comprehensive Radiological Survey of Kress Creek, West Chicago, Illinois," is included in the Administrative Record (see index, Attachment 1).

In 1984 and 1985, Kerr-McGee, with assistance from the City of West Chicago, conducted a voluntary cleanup program to identify

and remediate contaminated properties. Kerr-McGee specified an external gamma exposure criterion of 35 microRoentgen per hour (" $\mu\text{R/hr}$ ") at 1-meter height for the discovery of contaminated properties. However, Kerr-McGee based cleanup decisions in the field on a criterion of 30 $\mu\text{R/hr}$. (At the time, background was considered to be approximately 15 $\mu\text{R/hr}$.) Over 2700 properties within the City were surveyed during this program, and 117 locations that exceeded the Kerr-McGee external gamma exposure criterion were identified. Kerr-McGee excavated 34,868 cubic yards (" yd^3 ") of thorium residuals from 116 of the 117 identified properties within the City by the end of 1985 and returned the materials to the REF. (Seventy-one of the 77 locations identified by Frigerio et al. were accounted for in the Kerr-McGee program effort.) One of the property owners refused access for excavation of the materials, and, at several other properties where excavation work was conducted, some residuals were left behind (e.g., under foundations, near a support wall for a swimming pool). At the majority of properties remediated, the thorium materials at the identified locations were excavated until the exposure rate was reduced to background or below 15 $\mu\text{R/hr}$.

In late 1985, Kerr-McGee initiated surveys in areas outside the City, and identified additional properties that exceeded the external gamma exposure criterion, including properties along Kress Creek. Kerr-McGee was unable to remove contaminated materials from these properties, however, because the City would not allow thorium materials from outside the City to be brought back into the City (to the REF). Therefore, the properties that Kerr-McGee identified as contaminated (above 30 $\mu\text{R/hr}$ at 1-meter height) in 1985 in the unincorporated areas of West Chicago remain contaminated.

In October 1984, EPA proposed four sites in the West Chicago area for placement on the NPL, including the Kerr-McGee Residential Areas Site and the Kerr-McGee Kress Creek/West Branch of DuPage River Site.

In 1989, EG&G conducted a second aerial radiological survey of the West Chicago area for IDNS. The 1989 aerial survey used improved instrumentation and flew at lower elevations compared to the 1977 ARMS flyover. A map showing the boundary of elevated gamma levels was submitted to IDNS, but no supporting documentation was provided.

In 1989, IDNS began performing screening-level surveys of residential properties as part of its environmental program in and around the West Chicago area. Surveys initially were conducted to "ground-level-verify" the results of the 1989 aerial survey. IDNS currently conducts surveys at the request of potentially-affected property owners. These surveys generally consist of outdoor gamma exposure rate surveys and a soil sample

from the location on the property with the highest gamma reading. Also, at the request of the school districts, in 1990 IDNS conducted radiological surveys of seven school properties as well as outdoor radon/thoron and air particulate evaluations for several schools. In the period July 31, 1989, through August 12, 1993, IDNS surveyed approximately 160 properties in the West Chicago area, and had categorized 48 of these as "contaminated."

In August of 1990, the Kerr-McGee Residential Areas Site was finalized on the NPL. As described below, EPA remedial activities at the Residential Areas NPL Site are underway and will continue concurrent with and in support of the removal action discussed in this Action Memo.

In February of 1991, the Kerr-McGee Kress Creek/West Branch of DuPage River Site was finalized on the NPL. EPA remedial activities are underway at the Kress Creek NPL Site, and will continue after the removal action discussed in this Action Memo is complete. EPA is conducting a Remedial Investigation/Feasibility Study at the Site, and will then select a remedy for the entire Site. The removal action discussed in this Action Memo addresses only a small portion of the Kress Creek NPL Site, specifically contaminated residential properties in the floodplain.

In 1993, EPA completed a Preliminary Focused Risk Assessment ("PFRA") for the Residential Areas NPL Site. The PFRA used data that had been collected by IDNS from 4 residences and 3 schools and was conducted to provide a preliminary indication of the general risk range that possibly may be present at the Site. Soil contamination at the selected residences ranged from 28 to 780 picoCuries per gram ("pCi/g"), with external gamma exposures (measured at 1-meter height) ranging from 52 to 590 $\mu\text{R/hr}$ above background (considered to be approximately 7 $\mu\text{R/hr}$). The risks at the selected residences under current and future land use conditions were generally above what EPA considers acceptable. The levels of soil contamination at the 3 schools that were evaluated ranged from slightly above background to 35 pCi/g, and with different exposure assumptions (compared to residential exposure assumptions), the risks were less than for the residences. However, risks for potential future residential use of the school properties were above acceptable levels.

In November 1993, EPA finalized the Discovery and Characterization Criteria for the Residential Areas NPL Site and the Verification Criteria for the Residential Areas Removal Site. These criteria, contained in the document "Action Criteria for Superfund Removal Actions at the Kerr-McGee Residential Areas Site, West Chicago, Illinois," are being used for the discovery and characterization of contaminated properties, and will be used for verification activities during and after the removal action. Although there are criteria for several different parameters

(including outdoor soil concentration, outdoor gamma exposure rates, indoor gamma exposure rates, and indoor radon/thoron decay product concentrations), the primary criterion that will be used to make cleanup decisions is outdoor soil concentration. Specifically, properties will be targeted for removal action if dry soil concentrations of total radium (Ra-228 plus Ra-226) exceed 5 pCi/g above background. (EPA currently is establishing background levels, but it is expected that the background levels of Ra-228 and Ra-226 will be roughly 1 pCi/g each.) Cleanups shall proceed until levels no longer exceed 5 pCi/g above background. In addition, cleanups will use the concept of "ALARA" (As Low As Reasonably Achievable). A summary of the verification criteria, which will be used during and after the removal action, is shown in Attachment 3. A complete description of all the action criteria (discovery/characterization and verification) is contained in the action criteria document cited above, which is included in Appendix A of the Engineering Evaluation/Cost Analysis, which is attached to this Action Memo as Attachment 8.

Currently, EPA is conducting Fund-lead remedial activities in order to identify those contaminated properties needing remediation. This work, known as the discovery and characterization phase, will support the removal action recommended in this Action Memo, and will address all affected properties in the Residential Areas NPL Site and residential properties located in the floodplain of the Kress Creek NPL Site. EPA is using the results of the 1989 aerial radiological survey to define the boundary of the study area for the discovery and characterization phase. Attachment 2 is a map of EPA's study area, which includes approximately 1500 properties. EPA began the discovery and characterization fieldwork in January 1994 by commencing indoor radon/thoron and indoor gamma surveys at homes within the study area. The outdoor discovery and characterization fieldwork began in April 1994 and will continue throughout 1995. (The discovery and characterization work EPA is conducting is described in detail in the document "Work Plan for the Engineering Evaluation/Cost Analysis and Remedial Investigation/Feasibility Study, Kerr-McGee Residential Areas, West Chicago, Illinois," February 1994. The Work Plan is included in the Administrative Record (see index, Attachment 1).

IDNS has been working cooperatively with EPA during the planning and implementation of remedial activities at the Residential Areas NPL Site. Soil samples collected by EPA during discovery and characterization fieldwork are being analyzed at the IDNS laboratory. When the removal action commences, IDNS will conduct the verification activities for EPA at the Residential Areas Removal Site to ensure that the cleanups are done in accordance with the established cleanup criteria. EPA anticipates that the actual removal action will be conducted by Kerr-McGee.

In conjunction with the Fund-lead remedial activities which are underway, EPA has been conducting and will continue to conduct community relations activities to keep the community informed about the Site and involved in the decision-making process. A Community Relations Plan has been prepared and is included in the Administrative Record.

The materials of concern at the Site are thorium mill tailings which contain radionuclides such as thorium, uranium and radium, and heavy metals such as lead, barium and chromium. All of these are hazardous substances as defined by Section 101(14) of CERCLA. Access to the hazardous substances currently is unrestricted, and due to the nature of the Site (e.g., residential properties), it would be difficult and impractical to restrict access. As a result, the primary routes of exposure include direct exposure to gamma radiation from contaminated soil, incidental ingestion of contaminated soil, inhalation of radon/thoron decay products, ingestion of contaminated vegetables grown in contaminated soil, and direct contact with skin. Because thorium is very insoluble (unless in the presence of very strong acids), contamination of groundwater from the contamination at the Residential Areas Removal Site is not considered a pathway of concern. However, because the contaminated soil is expected to be largely at or near the ground surface, wind, erosion or deliberate human movement could cause the hazardous substances to migrate.

As mentioned earlier, the number of contaminated properties, and thus the volume of contaminated soil to be removed, is unknown at this time. However, a range of volumes and cost estimates for the removal action has been developed in an Engineering Evaluation/Cost Analysis prepared by EPA dated August 1994.

(Volume and cost estimates are described in Section V.B. of this Action Memo.)

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions at the Kerr-McGee Residential Areas Removal Site currently exist which, if not addressed by implementing the response action documented in this Action Memorandum, may present an imminent and substantial endangerment to public health or welfare or the environment. The conditions at the Residential Areas Removal Site meet the criteria for a removal action as set forth in the NCP, Section 300.415(b)(2), specifically:

- A) Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby human populations, animals or the food chain.

This factor is present at the Residential Areas Removal Site because of the existence of thorium mill tailings

in the soils of residential and non-residential properties, including municipal, commercial and institutional properties. The thorium mill tailings contain radionuclides such as thorium, uranium and radium, and heavy metals such as lead, barium and chromium, all of which are hazardous substances as defined by Section 101(14) of CERCLA. Nearby human populations and animals may be exposed to the hazardous substances by the following routes of exposure:

- 1) Direct gamma exposure both inside and outside structures resulting from radioactive decay from contaminated soil outside structures
- 2) Incidental ingestion of contaminated soil
- 3) Inhalation of radon and thoron decay products within enclosed structures (i.e., homes) emanating from contaminated soil beneath or against the foundation of the structure
- 4) Ingestion of contaminated homegrown vegetables
- 5) Dermal exposure to beta emitters from direct contact of skin with contaminated soils

An unknown number of properties at the Residential Areas Removal Site contain levels of radionuclides that exceed the Site-specific action level of 5 pCi/g above background. EPA believes that the presence of any additional hazardous substances, such as the metals lead, barium and chromium, is due to the presence of the mill tailings and that excavation of the mill tailings to the cleanup standards for radionuclides described in Section II of this Action Memo and the action criteria document (Appendix A of Attachment 8) will adequately mitigate any risk presented by these metals. EPA currently is investigating whether such metals are present at levels of concern.

The thorium mill tailings at the Residential Areas Removal Site emit ionizing radiation. Exposure to ionizing radiation, if at sufficiently high doses and dose rates, can cause carcinogenic, genetic and teratogenic effects. For this Site, the potential for cancer induction in exposed individuals is considered to be the greatest health concern. Ionizing radiation is a demonstrated human and animal carcinogen, based on data that correlates high exposures of radiation to cancer induction. Although significant uncertainty exists from extrapolating high-level information to low-level effects, current radiation protection

standards are based on the idea that each increment of radiation exposure causes a linear increase in the risk of cancer.

In addition to hazards from exposure to radiological emission products, uranium is chemically toxic to the kidneys.

Lead is the most common toxic metal in the environment, and there are many effects from chronic exposure to low levels, ranging from anemia to impairment of the nervous, hematopoietic and cardiovascular systems. The effects of exposure to barium can include paralysis, cardiovascular abnormalities and gastroenteritis. Chronic ingestion of hexavalent chromium can cause kidney damage, while chronic inhalation can cause lung cancer.

The Illinois Department of Public Health, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry, conducted a Public Health Assessment for the "Kerr-McGee Radiation Areas." The Public Comment Release version of the Public Health Assessment (included in Administrative Record; see index, Attachment 1) stated that although the health outcome data that has been evaluated indicated increases in certain cancers in the community and workers at the REF, the studies were inconclusive with respect to identifying the Kerr-McGee wastes as the cause of the cancers.

The Public Health Assessment concluded that the conditions at the site "are a public health hazard because of the risk to human health resulting from past, present and potential future exposure to radioactive and nonradioactive substances at concentrations that may result in adverse health effects." The Public Health Assessment recommended that "Action should be taken to reduce public exposure in residential areas which still have tailings, including properties along Kress Creek and the West Branch of the DuPage River. If no permanent solution is available, interim measures should be taken." (See Attachment 4, which consists of selected pages from the Public Health Assessment.)

- B) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.

This factor is present at the Residential Areas Removal Site due to the existence of thorium mill tailings in

surface and near subsurface soils that may migrate due to wind, erosion, deliberate human movement, or migration of radon/thoron gas from soils into structures.

The action level for this Site is 5 pCi/g above background for total radium (Ra-228 plus Ra-226). It is expected that background levels of Ra-228 and Ra-226 are approximately 1 pCi/g each. The four residences sampled by IDNS that EPA evaluated in the Preliminary Focused Risk Assessment had soil concentrations ranging from 28 to 780 pCi/g. The Frame reports (1981 and 1984) indicate that the data from the banks of Kress Creek fell within this range. Most of the properties remediated by Kerr-McGee in the mid-1980s had concentrations (according to Kerr-McGee unvalidated data) in this same range prior to excavation, but several had concentrations significantly higher than this. It is expected that the majority of properties that will be identified by EPA during the discovery and characterization phase will have levels within the same range as those evaluated in the Preliminary Focused Risk Assessment, but some properties with higher levels still may exist. Most of the contamination is expected to be found in the top 2 feet of soil (as was found during the mid-1980s cleanup effort by Kerr-McGee).

Radon-222 (commonly known as radon) and radon-220 (commonly known as thoron) are the gaseous decay products of uranium and thorium, respectively. If mill tailings are located in the soils against or beneath the foundation of a structure, radon and thoron can migrate through the soils and into the structure through sumps or cracks in the foundation. Although indoor air monitoring was not routinely done during Kerr-McGee's cleanup effort in the mid-1980s, Kerr-McGee found at least one home with significantly elevated levels of thoron due to mill tailings beneath the house.

The hazardous substances at the Site also may migrate due to wind or erosion (if there are contaminated areas without a good vegetative cover) or by deliberate human movement of soils.

- C) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

This factor is present at the Residential Areas Removal Site due to the existence of thorium mill tailings in surface and near subsurface soils that may migrate due

to wind or erosion. Such migration may occur if there are contaminated areas without a good vegetative cover or if there are contaminated areas that have been disturbed by human activities.

IV. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the radioactive hazardous substances in residential and non-residential properties at the Site at levels above the established cleanup criteria for the Site, the public health risks from the Site as documented in the Public Health Assessment (see Attachment 4) prepared by the Illinois Department of Public Health under cooperative agreement with the Agency for Toxic Substances and Disease Registry, and the actual or potential exposure pathways to nearby populations described in Sections II and III above, the actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

The following actions are proposed to mitigate the imminent and substantial endangerment to human health or welfare or the environment posed by contaminated soils at the Site:

a) Excavate contaminated materials from properties in the Residential Areas Removal Site (including affected properties at the Kerr-McGee Residential Areas NPL Site and affected residential properties along the Kress Creek NPL Site) found to exceed EPA's discovery and characterization criteria until levels at or below the verification criteria are reached, including implementing the ALARA principle (see action criteria document, Appendix A of Attachment 8).

b) Provide additional measures (e.g., indoor engineering controls for radon/thoron, institutional controls) for those limited and exceptional situations that may occur where complete excavation of contaminated materials cannot be accomplished and such measures are needed to reduce exposures and associated risks.

- c) Minimize the potential health hazards to workers performing the removal action and to nearby residents during the removal action.
- d) Backfill the excavations with clean soil and restore properties to their original condition or to such other condition as may be arranged with the property owner.
- e) Use appropriate environmental monitoring during and after removal to verify that cleanup levels are reached and short-term impacts (e.g. generation of dust during removal) are minimized.
- f) After excavation, transport all contaminated materials away from the affected properties and ship all contaminated materials removed from affected properties by rail to a permanent off-site disposal facility licensed to accept and dispose of 11(e)(2) byproduct material.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances at the Residential Areas Removal Site which may pose an imminent and substantial endangerment to public health and safety, and to the environment. These response actions do not impose a burden on affected property disproportionate to the extent to which that property contributes to the conditions being addressed. The response action will comply with the Off-Site Rule (58 F.R. 49200, September 22, 1993). The appropriate State officials in the receiving State will be notified, prior to actual shipment of wastes, that wastes from the Residential Areas Removal Site will be shipped to a disposal area in that State as part of this response action.

Currently, EPA anticipates that the removal action will be conducted by Kerr-McGee. If so, Kerr-McGee would use the REF as a staging area for the wastes, which then would be shipped by rail to a permanent disposal site in Utah (Envirocare) concurrent with other wastes from the REF. In the unlikely event that transportation of the wastes to the permanent disposal facility is delayed, interim storage of the wastes at the REF would be allowed by EPA, subject to any necessary State or local approvals.

In the event that Kerr-McGee does not conduct the removal action and such action must be carried out by EPA as a Fund-lead action, an off-REF staging area probably would be used by EPA. Such staging area would consist of an available railyard where properly packaged wastes would be staged and loaded onto railcars for shipment to the disposal site.

Wastes would need to be properly packaged, labeled, manifested, and otherwise ready for shipment when taken to the off-REF staging area to avoid the need for licensing of the staging area. In the event that Kerr-McGee does not conduct the removal action and this contingent action becomes necessary, another Action Memorandum would be required to request and secure funding for the Fund-lead action, and more details would be provided as necessary in that Memorandum.

EPA evaluated a number of possible response actions in the Engineering Evaluation/Cost Analysis (Attachment 8), and has determined that excavation of the contaminated soils and off-site disposal (the alternative recommended) is the only feasible long-term solution for mitigating the threats posed by the Site. Excavation permanently segregates the contaminated soils from the public and is therefore effective at reducing exposure to nearby populations. Excavation technology using standard construction procedures and conventional equipment has been successfully applied at the similarly contaminated sites throughout the United States.

Although excavation of contaminated soils is the primary component of the removal action, situations may be encountered where complete excavation cannot be accomplished and additional measures are needed to reduce exposures and associated risks. In such limited and exceptional situations, it may be necessary to provide additional measures such as institutional controls or engineering controls for radon/thoron.

EPA must continue its discovery and characterization activities in order to fully characterize the extent of the contamination at the Site (i.e., number of contaminated properties and the volume of contaminated soil). However, removals need not wait until the entire Site has been characterized, but should begin as soon as possible (weather permitting) on the properties that already been identified as contaminated.

A public comment period was held on the Engineering Evaluation/Cost Analysis ("EE/CA") (see Section V.A.4. of this Memo). EPA reviewed all public comments received during the public comment period and determined that the scope of the removal action recommended in the EE/CA did not need to be changed as a result of the comments. However, as indicated in the written response to significant comments (Attachment 9), EPA continues to evaluate additional recontamination prevention measures to prevent the residential properties along Kress Creek from becoming recontaminated after they are cleaned up due to future flood

events and will complete this evaluation before excavation begins at any of the Kress Creek properties. In the EE/CA, EPA had evaluated recontamination prevention measures, such as an earthen berm or steel sheet piling, and recommended that such measures not be implemented. However, one of the commenters suggested a different recontamination prevention measure, namely a geomembrane fabric or "silt fence." If EPA determines that such a measure is appropriate, based on an evaluation against the criteria of effectiveness, implementability and cost, EPA will amend this Action Memo, if necessary.

2. Contribution to Remedial Performance

The proposed removal action will contribute to the efficient performance of the long-term remedial action for the Residential Areas NPL Site, and will contribute to and is consistent with the long-term remedial action for the Kress Creek NPL Site. The proposed action is consistent with the concept of the Superfund Accelerated Cleanup Model, which encourages taking early actions at sites to promptly reduce risks. A Record of Decision ("ROD") has not been written for the Residential Areas NPL Site or the residential properties along the Kress Creek Site, but would undoubtedly select the same actions (e.g., excavation and off-Site disposal) proposed in this Memo.

For the Residential Areas NPL Site, EPA will continue to collect additional data on the nature and extent of contamination as it proceeds with the discovery and characterization fieldwork already in progress. Additionally, verification data collected from properties during and after excavation of contaminated soils will be evaluated to assess the conditions of the post-removal Site (i.e., amount of residual materials remaining after removal and risks from such residuals). All such data will be incorporated into a Remedial Investigation/Feasibility Study for the Site. At some point during this process, EPA will write a ROD documenting the decision on the final remedial action for the Site. EPA anticipates that properties at the Residential Areas NPL Site undergoing removal action as a result of this Action Memo will require no further action in the future.

For the Kress Creek NPL Site as a whole, EPA is conducting a Remedial Investigation/Feasibility Study which will lead to selection of the final remedy for the Site, the majority of which is not addressed by the actions proposed in this Action Memo. For the residential properties along the Kress Creek NPL Site addressed by this Action Memo, removal of the contaminated soil will contribute to and is consistent with the long-term remedial action for the NPL Site. The

possibility exists that additional measures may be needed at these properties in the future, however, because the sediments of the creek will remain contaminated until addressed by the final remedy for the Site, and future flood events may recontaminate the properties to some extent. It is unknown whether a severe flood event will occur in the interim, and if it does, it is unknown to what extent the properties would be recontaminated, if at all. EPA believes that such recontamination, if it occurred, would be less than the contamination that currently exists on the properties. Therefore, in order to achieve prompt risk reduction to the affected residents, EPA believes that the contaminated residential properties along Kress Creek should be included in the Residential Areas Removal Site and undergo removal action at the same time as other properties, even though additional actions may be necessary in the future. The residents who live along the creek who did submit comments to EPA support this approach. Also, as discussed in Section V.A.1. of this Action Memo, EPA will continue to evaluate additional recontamination prevention measures for the residential properties along Kress Creek, and will amend this Action Memo in the future if necessary.

3. Description of Alternative Technologies

Alternative treatment technologies were considered in the EE/CA but are not proposed. As discussed in detail in the EE/CA, the physical and chemical treatment technologies available did not pass the initial screening of alternatives because they were judged not to be effective for the radioactively contaminated soils from this Site.

4. Engineering Evaluation/Cost Analysis - EE/CA

The EE/CA Approval Memorandum, dated August 19, 1993, is attached to this Action Memo as Attachment 7. The actual EE/CA, dated August 1994, is attached to this Action Memo as Attachment 8. The EE/CA should be consulted for further information regarding the range of possible removal alternatives considered and the evaluation of alternatives against the criteria of effectiveness, implementability and cost.

A public comment period on the EE/CA and the recommended removal action began on August 4, 1994, and originally was scheduled to end on September 2, 1994. During that time, however, EPA received a timely request for an extension, and thus extended the public comment period until September 19, 1994. A public meeting was held on August 17, 1994, with a court reporter present to record the proceedings, including verbal comments on the EE/CA and the recommended removal action. A transcript of the meeting is included in the

Administrative Record. During the public comment period, written comments were received from several residents of the West Chicago area, the Illinois Department of Public Health, the City of West Chicago, and Kerr-McGee Chemical Corporation. All written comments are included in the Administrative Record. EPA considered all significant comments prior to recommending the proposed actions contained in this Action Memo. Attached to this memo as Attachment 9 is EPA's written response to the significant (verbal and written) comments that EPA received.

5. Applicable or Relevant and Appropriate Requirements ("ARARs")

Appendix B of the EE/CA discusses in detail the preliminary list of federal and state ARARs for the removal action at the Residential Areas Removal Site. (State ARARs were provided by the State prior to finalization of the EE/CA.) For all on-Site activities during the removal action, compliance with the Action Criteria for this Site (Appendix A of Attachment 8) is deemed to be compliance with all federal and state ARARs related to cleanup levels of radioactive contamination. The Action Criteria will be complied with during the removal action to the maximum extent practicable considering the exigencies of the situation. Other federal and state ARARs (discussed in Appendix B of the EE/CA) address other aspects of the removal action, and also will be complied with to the extent practicable considering the exigencies of the situation.

6. Project Schedule

The exact length of time to carry out the removal action is unknown at this time because the extent of contamination (number of contaminated properties and volume of contamination) is not yet known. EPA's discovery and characterization fieldwork to define the extent of contamination began early in 1994 and is scheduled to continue through the end of 1995, and will include the investigation of approximately 1500 properties in and around West Chicago. The removal action need not wait until the entire Site has been characterized, but should begin as soon as possible (weather permitting) on the properties that already have been identified, and continue for as long as necessary to address all properties found to be contaminated.

If, as EPA anticipates, Kerr-McGee implements the removal action, Kerr-McGee would submit a Removal Action Work Plan and other associated documents which detail how the removal will be conducted. Excavation can begin after the Work Plan is approved by EPA. Because of the approaching winter

months and the need to have an approved Work Plan for the Site work, excavation work will not begin until Spring 1995. EPA currently expects that the removal work would continue through the end of the 1995 construction season, and depending on the number of properties needing remediation, may continue into the 1996 construction season.

B. Estimated Costs

EPA anticipates that this removal action will be conducted by Kerr-McGee, therefore, detailed cost estimates are not required in this Memo. However, the following cost estimates are provided for informational purposes only. (EPA's discovery and characterization costs are considered part of the RI/FS for funding purposes, and therefore are not discussed herein.)

The costs for the removal action at this Site will be directly dependent on the extent of contamination (number of contaminated properties and volume of material), which has not yet been determined. However, using information from the previous Kerr-McGee cleanup effort in the mid-1980s, along with other available information and some reasonable assumptions, the EE/CA presented a possible range of costs for the response action. In order to have a consistent basis on which to estimate costs between the alternatives considered, the EE/CA assumed that all of the waste would be packaged in durable plastic bags for shipment to the disposal site. If Kerr-McGee conducts the removal action, wastes probably would be handled and shipped in bulk, so costs would vary from the estimates in the EE/CA. Additionally, the terms of Kerr-McGee's contract with the disposal facility (Envirocare) are confidential, so EPA does not know at this time the exact unit cost to Kerr-McGee for disposal; the EE/CA had to estimate this cost as well.

Cost estimates are provided in the EE/CA for four different volume scenarios, as shown in the table in Attachment 5. The costs range from \$22 million for 15,000 yd³ of material (estimated volume from 50 properties) to \$119 million for 120,000 yd³ of material (estimated volume from 400 properties). The actual costs probably will fall somewhere between these two extremes. The figure in Attachment 6 graphically depicts the estimated cost breakdown for each of the four volume scenarios. More details on the cost estimates are included in the EE/CA (Attachment 8).

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action is delayed or not taken, public health risks to the population living on or adjacent to contaminated properties at

the Site will increase due to prolonged exposure to direct gamma radiation, incidental ingestion of contaminated soil, inhalation of radon and thoron decay products, ingestion of contaminated homegrown vegetables, and direct contact with contaminated soils.

VII. OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

EPA sent Kerr-McGee a "General Notice of Potential Liability" letter on April 14, 1994, notifying Kerr-McGee that it is considered a PRP with regard to the Site, and asking Kerr-McGee about its willingness to negotiate an agreement for the conduct of removal actions at the Site. Kerr-McGee indicated a willingness to negotiate with EPA. The parties negotiated through October 1994. On October 31, 1994, Kerr-McGee indicated that it could not accept the terms of EPA's final offer. EPA has reason to believe that Kerr-McGee would comply with a Unilateral Order.

Further details regarding EPA's negotiation and enforcement strategy are considered "enforcement sensitive." For administrative purposes, such information is contained in an Enforcement Confidential Addendum to this Action Memo.

IX. RECOMMENDATION

This decision document represents the selected removal action for the Kerr-McGee Residential Areas Removal Site in DuPage County, Illinois, developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP Section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action. Please indicate your decision by signing below.

APPROVED: _____

Robert Spangis
for Regional Administrator

DATE: _____

11/18/94

DISAPPROVED: _____

Regional Administrator

DATE: _____

Enforcement Confidential Addendum

Attachments

1. Index to Administrative Record
2. Site Map
3. Summary Table of Verification Criteria
4. Selected Pages from Public Comment Release Version of the Public Health Assessment for the Kerr-McGee Radiation Areas
5. Table -- Cost Estimates
6. Figure -- Cost Estimates
7. EE/CA Approval Memorandum
8. Engineering Evaluation/Cost Analysis (EE/CA)
9. Written Response to Significant Public Comments

cc: Terri Johnson, EPA HQ, 5202G
Don Henne, U.S. Department of the Interior
Custom House, Room 217
200 Chestnut Street
Philadelphia, PA 19106-2904
Gary King, IEPA Superfund Coordinator
Gordon Appel, Deputy Director
Illinois Department of Nuclear Safety
1035 Outer Park Drive
Springfield, IL 62704

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bcc (w/out EE/CA): A.Baumann
R.Karl
J.Cisneros
L.Fabinski, ATSDR
O.Warnsley
E.Deamer
L.Jensen
R.Frey
K.Tindall
J.Traub
W.Muno
K.Westlake
M.Radell
A.Turner, CH2M Hill

Original: Kerr-McGee Residential Areas Site File

ATTACHMENT 1

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
KERR-MCGEE RESIDENTIAL AREAS REMOVAL SITE
WEST CHICAGO, ILLINOIS

NOVEMBER 18, 1994

<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE DESCRIPTION</u>	<u>PAGES</u>
06/00/74	U.S. Atomic Energy Commission		Regulatory Guide 1.86: Termination of Oper- ating Licenses for Nuclear Reactors	5
09/00/78	Frigerio, N., et al.; Ar- gonne National Laboratory	U.S. NRC	Report: Thorium Residuals in West Chicago, IL (NUREG/ CR-0413; ANL/ES-67)	33
00/00/80	Russell, J. U.S. EPA	Jensen, L., Region 5/ U.S. EPA	Memorandum re: External Exposure Rates from Thorium and Uranium in Soil	3
04/00/81	Ad Hoc Tech- nical Group	U.S. EPA	Findings of Ad Hoc Technical Group on Cleanup of Open Land Contaminated with Uranium Mill Tailings	22
11/00/81	Frame, P., Oak Ridge Associated Universities, TN	U.S. NRC	Final Report: Radio- logical Survey of Kress Creek, West Chicago, IL	21
10/00/82	ORP/U.S. EPA	U.S. EPA	Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (40 CFR 192): Volume I (EPA 520/ 4-82-013-1)	

10/00/82	ORP/U.S. EPA	U.S. EPA	Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (40 CFR 192): Volume II (EPA 520/4-82-013-2)	
09/00/83	ORP/U.S. EPA	U.S. EPA	Final Environmental Impact Statement for Standards for the Control of Byproduct Materials from Uranium Ore Processing (40 CFR 192): Volume I (EPA 520/1-83-008-1)	
09/00/83	ORP/U.S. EPA	U.S. EPA	Final Environmental Impact Statement for Standards for the Control of Byproduct Materials from Uranium Ore Processing (40 CFR 192): Volume II (EPA 520/1-83-008-2)	
02/00/84	Frame, P., Oak Ridge Associated Universities, TN	U.S. NRC	Final Report: Comprehensive Radio- logical Survey of Kress Creek, West Chicago Area, IL	93
02/08/90	U.S. DOE	U.S. EPA	DOE Order 5400.5: Radiation Protection of the Public and the Environment	87
12/00/90	OSWER/ U.S. EPA	U.S. EPA	Superfund Removal Procedures: Action Memorandum Guidance (EPA/540/P-90/004)	65
03/00/92	Russell, J., and Richard- son, C., ORP/ U.S. EPA		Paper Presented at Waste Management '92 Symposium: Cleanup Standards for Radium Contaminated Soils	7
01/00/93	Sanford Cohen & Associates, Inc.	U.S. EPA	Preliminary Focused Risk Assessment for West Chicago Vicinity Properties	103

02/25/93	Kerr-McGee Chemical Corporation	U.S. EPA	Comments on the Focused Risk Assessment and Associated Fact Sheet	30
02/25/93	Meserve, R., Covington & Burling	Frey, R., U.S. EPA	Letter re: the Focused Risk Assessment and Associated Fact Sheet	2
03/01/93	Meserve, R., Covington & Burling	Frey, R., U.S. EPA	Letter re: Comments on the Focused Risk Assessment and Associated Fact Sheet	2
03/29/93	Kerr-McGee Chemical Corporation	U.S. EPA	Comments on the Action Criteria for Superfund Removal Actions and the Associated Fact Sheet	90
03/29/93	Kerr-McGee Chemical Corporation	U.S. EPA	Exhibits to Comments on the Action Criteria for Superfund Removal Actions and the Associated Fact Sheet	310
03/29/93	Meserve, R., Covington & Burling	Frey, R., U.S. EPA	Letter re: Action Criteria for Superfund Removal Actions (Review Draft: March 1993)	1
04/28/93	Meserve, R., Covington & Burling	Frey, R. and Radell, M., U.S. EPA	Letter re: Various Comments on the West Chicago Superfund Sites w/Attachment	7
05/05/93	Meserve, R., Covington & Burling	Frey, R., U.S. EPA	Letter re: Proposed Storage of Tailings at Manville Oaks Park w/Attachment	3
06/00/93	Kathren, R., et al.	U.S. NRC	Scientific and Public Issues Committee Position Statement: Radiation Standards for Site Cleanup and Restoration (Health Physics Society News- letter)	4

06/02/93	Meserve, R., Covington & Burling	Frey, R., U.S. EPA	Letter Forwarding Various Attached U.S. EPA Documents re: Criteria to Guide Response Actions	107
06/18/93	Oge, M., ORIA/U.S. EPA	Kee, D., Region 5/ U.S. EPA	Memorandum re: Technical Input on Cleanup Criteria for West Chicago Residential Area Superfund Site w/Attachment	5
07/00/93	U.S. NRC		Regulatory Guide 8.37: ALARA Levels for Effluents from Materials Facilities	6
08/00/93	OSWER/ U.S. EPA	U.S. EPA	Guidance on Conduct- ing Non-Time-Critical Removal Actions Under CERCLA (EPA/540-R-93- 057; Publication 9360.0-32; PB93-963402)	66
08/11/93	U.S. EPA		Statement of Work for Conducting an EE/CA and RI/FS	31
08/19/93	Frey, R., U.S. EPA	File	Action Memorandum: Request for Author- ization to Proceed with Contracting for the Performance of an EE/CA and RI/FS	2
08/19/93	Frey, R., U.S. EPA	File	EE/CA Approval Memorandum	2
09/17/93	McReynolds, M., U.S. EPA	CH2M Hill	Work Assignment Form: Initial Assignment of Work Dated August 17, 1993	1
10/05/93	Meserve, R., Covington & Burling	Frey, R. and Seely, D., U.S. EPA	Letter re: Indoor Radon Levels	3
10/22/93	Meserve, R., Covington & Burling	Frey, R. and Seely, D., U.S. EPA	Letter re: the Radium-in-Soil Standard	7

10/22/93	Meserve, R., Covington & Burling	Oge, M., ORIA/U.S. EPA	Letter re: Radium- in-Soil Cleanup Standards for Certain CERCLA Sites in West Chicago	2
11/00/93	Illinois Dept. of Public Health: et al.		Public Health Assessment--Public Comment Release re: Kerr-McGee Radiation Areas, West Chicago, IL	202
11/00/93	U.S. EPA		Action Criteria for Superfund Removal Actions at the Kerr- McGee Residential Areas Site	19
12/00/93	U.S. EPA		Summary of Responses to Public Comments on the March 1993 Review Draft of Action Criteria for Superfund Removal Actions	16
12/01/93	McReynolds, M., U.S. EPA	CH2M Hill	Work Assignment Form: Authorization to Start Work on the EE/CA Task	1
12/07/93	Oge, M., ORIA/U.S. EPA	Meserve, R., Covington & Burling	Letter re: Cleanup Criteria for the Kerr- McGee West Chicago NPL Sites	2
02/00/94	CH2M Hill	U.S. EPA	Work Plan for the EE/CA and RI/FS	103
02/18/94	Meserve, R., Covington & Burling	Frey, R., and Seely, D., U.S. EPA	Letter re: Action Criteria for Superfund Removal Actions	8
03/00/94	U.S. EPA	Public	Fact Sheet: U.S. EPA Begins Field Work at Kerr-McGee Residential Areas Site	6
06/10/94	PRC Environ- mental Manage- ment, Inc.	U.S. EPA	Community Relations Plan	89

07/14/94	OSWER/ U.S. EPA	U.S. EPA	Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (OSWER Directive #9355.4-12)	25
08/00/94	CH2M Hill	U.S. EPA	Engineering Evaluation/Cost Analysis, Kerr-McGee Residential Areas Site and Portions of the Kress Creek Site	179
08/00/94	U.S. EPA	Public	Fact Sheet: U.S. EPA Recommends Cleanup Plan for the Kerr-McGee Residential Areas Site and Portions of the Kress Creek Site	6
08/04/94	U.S. EPA	Public	Public Notice: U.S. EPA Announcement of Public Meeting and Public Comment Period re: the EE/CA Document for Removal Actions	1
08/05/94	Meserve, R., Covington & Burling	Frey, R., U.S. EPA	Letter re: Request for an Extension to the Public Comment Period on the EE/CA	2
08/17/94	County Court Reporters, Inc.	U.S. EPA	Transcript of August 17, 1994 Public Meeting	153
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00/00/00	Frey, R., U.S. EPA	U.S. EPA	Action Memorandum: Determination of Threat to Public Health or Welfare or the Environ- ment at the Kerr-McGee Residential Areas Site and Portions of the Kress Creek Site [PENDING]	

ATTACHMENT 2

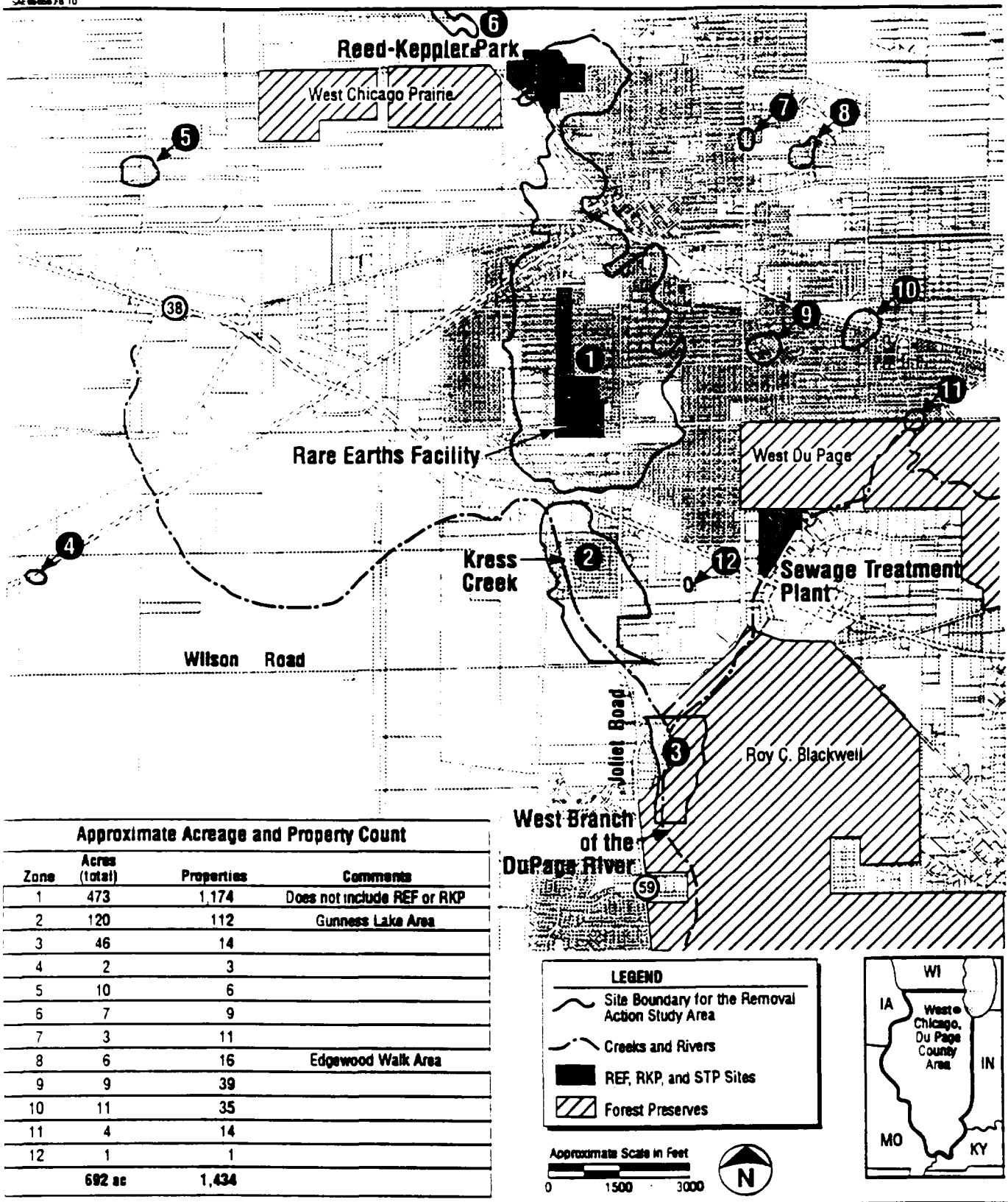


Figure 1-2
Study Area
 Residential Areas Site and Portions of the Kress Creek Site

ATTACHMENT 3

Table 3-1
Summary of EPA Action Criteria for the Verification Phase

Topic	Unit of Measure	Background ^a	Criteria
Indoor thoron and radon decay product concentrations	WL (working level)	0.002 WL	Reasonable efforts must be made to achieve an annual average concentration (including background) in occupied buildings of no more than 0.02 WL; in any case, the concentration (including background) must not exceed 0.03 WL [40 CFR 192.12(b)(1) and 192.40(b)].
Outdoor gamma exposure rate	μ R/hr (microRoentgen per hour)	5 to 13 μ R/hr	After backfilling, the outdoor gamma exposure rates must not statistically exceed background at a distance of 100 cm from the surface [Illinois Administrative Code, Section 332.150(b)(2)].
Indoor gamma exposure rate	μ R/hr (microRoentgen per hour)	Background data unavailable	Indoor gamma exposure rates must not statistically exceed background [Illinois Administrative Code, Section 332.150(b)(2)]. Note: This criterion will be used as a "finding tool" during verification to help determine if additional removal is necessary.
Radionuclide activity (concentration) in outdoor soils	pCi/g (picoCurie per gram) of dry soil	2.25 to 3 pCi/g ^b	Dry soil concentrations of total radium (Ra-226 plus Ra-228) must not exceed 5 pCi/g above background levels averaged over areas up to 100 m ² in any 15-cm depth [based on relevant and appropriate portions of Illinois Administrative Code, Section 332.150(b)(1)].
General approach for removal action	Not applicable	Not applicable	Every reasonable effort should be made to maintain exposures and radioactive material quantities ALARA [Illinois Administrative Code, Part 340; 10 CFR 20; Department of Energy (DOE) Order 5400.5; NRC Regulatory Guide 8.37].

^aBackground values shown are approximate and are based on current available data. Additional background data will be obtained during the pilot-test and discovery phases of the removal.

^bThis background value is for total radium: Ra-228 at 0.85 to 1.6 pCi/g and Ra-226 at 1.4 pCi/g (see Section 2.2.7).

ATTACHMENT 4

PUBLIC HEALTH ASSESSMENT

KERR MCGEE RADIATION AREAS

DUPAGE COUNTY

WEST CHICAGO, ILLINOIS

CERCLIS NOS.

KRESS CREEK = ILD980823991

REED-KEPPLER PARK = ILD980824007

RESIDENTIAL AREAS = ILD980824015

WASTEWATER TREATMENT PLANT = ILD980824031

Prepared by:

Illinois Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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CONCLUSIONS

On the basis of the information reviewed, IDPH has concluded that the Kerr-McGee Facility, Residential Areas, Reed-Keppler Park, the West Chicago Regional Wastewater Treatment Plant (WTP), Kress Creek, and the West Branch of the DuPage River are a public health hazard because of the risk to human health resulting from past, present and potential future exposure to radioactive and nonradioactive substances at concentrations that may result in adverse health effects. As noted in the previous sections, exposure to contaminants in and around these areas may have occurred via any combination of: inhalation of contaminated dust and gases; the ingestion of polluted dust, food, groundwater, sediment, soil, and surface water; and dermal exposure to contaminated dust, gases, soil, and surface water.

People in homes and businesses adjacent to the Kerr-McGee Facility, homes in contaminated residential areas, and visitors of Kress Creek and the West Branch of the DuPage River may be exposed to elevated levels of gamma radiation. Surface contamination is likely present in some areas, although this has not been well-investigated. Children may be exposed to radionuclides, gamma radiation, and lead in residential properties and along Kress Creek and the West Branch of the DuPage River. Lead contaminated media is of particular concern in areas frequented by children. The radioactive half-life of thorium-232 is about 14 billion years, and lead does not decompose, so the wastes will remain hazardous essentially forever. In the distant future, the greatest health hazard would occur if someone builds houses or other structures on the Kerr-McGee Facility or fenced spoil area of Reed-Keppler Park. Any such buildings would probably have elevated indoor radon and gamma radiation levels, and their yards would likely have high soil concentrations of lead and radionuclides, as well as elevated gamma radiation. Home building at the Wastewater Treatment Plant or near the banks of Kress Creek or the West Branch of the DuPage River are unlikely, yet home building in these areas would have similar concerns.

Exposures to airborne contaminants were certainly higher when the plant was still operating; however, the available data are too limited to fully assess the situation. Exposures were probably highest for plant workers, and the levels were probable high enough to increase the risk of adverse health effects as described in the Public Health Implications section of this report. Workers may have also increased the risk of their families if they took their clothes home to launder and did not shower before going home.

The greatest current risk of airborne exposure is for people in houses with tailings along their foundations or basements. These buildings may be at increased risk of elevated radon-220 and radon-222 levels. At this time, airborne exposure to radionuclides around the Kerr-McGee Facility is generally negligible. While radon-220 concentrations can become elevated around it, this is not a general occurrence and is of little health concern. However, remediation activities may greatly increase airborne emissions of radon and contaminated dust. This warrants measures to reduce these emissions. Elevated gamma radiation levels exist on and around the Kerr-McGee Facility. As previously noted, surficial radioactivity and elevated airborne radon levels in Reed-Keppler Park are restricted to the fenced area, while ambient long-lived radionuclides are at background levels. While some areas of elevated gamma radiation occur outside of the fence, it is unlikely that people are exposed to them for long periods. However, in the future, erosion or excavation could expose wastes buried outside of the fenced area, so this could change. Other areas have potentially negligible airborne exposure.

The community is concerned about their risk of cancer from exposure to the radioactive wastes of the Kerr-McGee Facility and around their community, radioactive contamination of groundwater, and direct radiation from the Kerr-McGee Facility. Contrary to the beliefs of some people in West Chicago, the radioactivity in the public water supply of the City comes from naturally occurring radium in the deep Ironton-Galesville Formation, and not from the Kerr-McGee wastes. While it is natural, it could add to other types of radioactive exposure and thus contribute to the problem.

Although the evaluated health outcome data indicated increases in certain cancers in the community and plant workers, these studies were basically inconclusive with respect to identifying the Kerr-McGee wastes as the cause of these cancers. However, these studies had several previously discussed problems, which could be addressed in a follow-up study.

RECOMMENDATIONS

- * Action should be taken to reduce public exposure in residential areas which still have tailings, including properties along Kress Creek and the West Branch of the DuPage River. If no permanent solution is available, interim measures should be taken.
- * The hydrogeology of the Kerr-McGee Facility, Reed-Keppler Park, the West Chicago Regional Wastewater Treatment Plant (WTP), Kress Creek, and the West Branch of the DuPage River should be investigated to assess the actual or potential contamination of private wells.
- * The leachability of the wastes at the Kerr-McGee Facility, Reed-Keppler Park, and the WTP should be assessed.
- * The presence, use, and water quality of private wells near the Kerr-McGee Facility, Reed-Keppler Park, and the WTP should be assessed.
- * The water quality of Kress Creek and the West Branch of the DuPage River should be assessed. Additional sampling of the West Branch of the DuPage River should be undertaken to define the extent and nature of radioactive and nonradioactive contamination of sediments and soils in and along the river.
- * The concentrations of chemicals in filets of fish from Kress Creek and the West Branch of the DuPage River should be determined.
- * The nature and concentrations of nonradioactive airborne contaminants, especially lead, in and around the Kerr-McGee Facility, Reed-Keppler Park, and the WTP should be examined.
- * The presence and concentration of PCBs and other nonradioactive compounds in the sediment and soils of Kress Creek and the West Branch of the DuPage River, should be assessed. Because contamination is variable in these areas, they should be surveyed prior to remediation. The possibility that radioactive and nonradioactive contaminants have affected downstream properties in Warrenville and Naperville should be investigated.

- * The contribution of present runoff from the Kerr-McGee Facility to the contamination of the sediments, adjacent soils, and water of Kress Creek and the West Branch of the DuPage River should be investigated.
- * The nature and extent of radioactive and nonradioactive contamination of the storm sewers in the Kerr-McGee Facility and residential areas should be determined.
- * Surface and subsurface contamination by radionuclides, lead, and other non-radioactive contamination in residential yards in and around West Chicago, the Kerr-McGee Facility, the WTP, Kress Creek, and the West Branch of the DuPage River should be investigated. Because nonradioactive and radioactive contaminant levels are not necessarily correlated, cleanup objectives should include all contaminants of concern.
- * Radon levels should be measured in all houses with tailings next to their foundations, and follow-up radon measurements should be performed after remediation, including the 11 houses originally tested.
- * In the various environmental media, the presence and concentrations of other chemicals used by Kerr-McGee should be assessed, including PCBs, lead, benzene, toluene, and xylene.
- * In homes with radioactive and/or non-radioactive contamination in garden soils, the edible portions of the foodstuffs should be analyzed.
- * During remediation, the dispersal of airborne radon and contaminated dust should be minimized. Computer modelling should be employed to estimate the dispersal of airborne contaminants which occurred during plant operation.

HEALTH ACTIVITIES RECOMMENDATION PANEL (HARP) RECOMMENDATIONS

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, the six Kerr-McGee areas have been evaluated for appropriate follow-up with respect to health activities. Kerr-McGee workers and members of the public have been exposed to contaminants from the areas. Action should be taken to reduce public exposure in residential areas which still have tailings, including properties along Kress Creek and the West Branch of the DuPage River. If no permanent solution is available, interim measures should be

taken. The results of the epidemiologic studies of workers and people in yards with tailings showed no conclusive relationship between radiation exposure and types of cancer which may be caused by radioactive materials. If the completed Remedial Investigation suggests exposure to hazardous substances has occurred at levels which may cause adverse health effects, IDPH, in conjunction with ATSDR, will reevaluate these six areas for any indicated follow-up.

As part of the ATSDR Physician Education Cooperative Agreement, IDPH will inform area health professionals of the public health implications associated with these six areas and others in the vicinity.

Further environmental characterization and sampling of the six areas during the RI/FSSs should be designed to address the environmental and human exposure pathways discussed above. When additional information and data become available, e.g., the completed RI/FSSs, such material will form the basis for further assessment by IDPH or ATSDR.

PUBLIC HEALTH ACTIONS

Based on the recommendations made in the health assessment, the following public health actions have been or will be undertaken:

1. As part of the ATSDR Physician Education Cooperative Agreement, IDPH will inform area health professionals of the public health implications associated with the Kerr-McGee areas and other sites in the vicinity.
2. In the upcoming USEPA Remedial Investigation, the nature and extent of contamination in the four NPL areas (Reed-Keppler Park, WTP, Residential Areas, and Kress Creek + West Branch of the DuPage River) will be investigated. In addition, the adequacy of past removal activities will be evaluated.

ATTACHMENT 5

Table 5-1
Cost Estimates for Alternative 2, Source Removal

Item	Soil Volume Scenario 1 ^a	Soil Volume Scenario 2 ^a	Soil Volume Scenario 3 ^a	Soil Volume Scenario 4 ^a
Volume (yd ³)	15,000	30,000	60,000	120,000
Number of Properties	50	100	200	400
Direct Capital Cost Items				
Health and Safety	\$615,200	\$1,161,900	\$2,264,500	\$4,478,900
Transportation	1,708,500	3,417,000	6,834,000	13,668,000
Excavation, Backfill, and Restoration	1,445,500	2,891,000	5,782,000	11,564,000
Disposal	9,750,000	15,750,000	24,000,000	40,500,000
Miscellaneous ^b	589,005	1,142,010	2,248,020	4,460,040
Subtotal Direct Capital Cost	\$14,108,205	\$24,361,910	\$41,128,520	\$74,670,940
Overhead and Profit	\$2,927,453	\$5,055,096	\$8,534,168	\$15,494,220
MOB ^c /Bond/Insurance (5% of subtotal)	705,410	1,218,096	2,056,426	3,733,547
Contingency (15% of subtotal)	2,116,231	3,654,287	6,169,278	11,200,641
Total Direct Capital Cost (rounded off)	\$19,857,000	\$34,289,000	\$57,888,000	\$105,099,000
Indirect Capital Cost Items				
Engineering and Design (8% of total)	\$1,588,560	\$2,743,120	\$4,631,040	\$8,407,920
Legal and Administrative (3% of total)	595,710	1,028,670	1,736,640	3,152,970
Licensing and Permitting (2% of total)	397,140	685,780	1,157,760	2,101,980
Subtotal Indirect Capital Cost	\$2,581,410	\$4,457,570	\$7,525,440	\$13,662,870
Grand Total (rounded off)	\$22,400,000	\$38,700,000	\$65,400,000	\$118,800,000

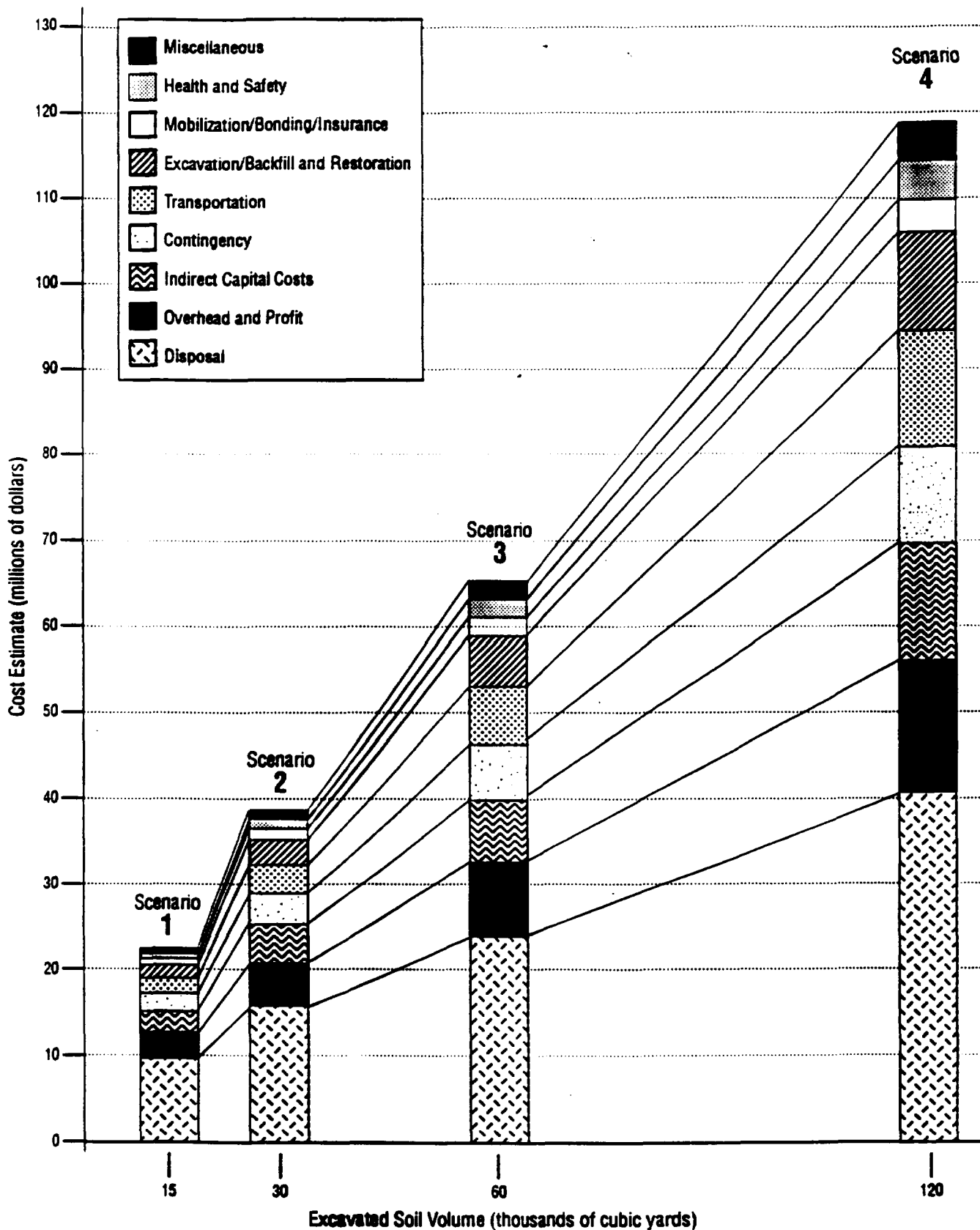
^aBasis for volume scenarios is discussed in Table 4-2.

^bMiscellaneous costs include loading, packaging, and sampling the waste material; verification sampling; and temporary family relocation.

^cMOB = Mobilization.

Note: Costs are order of magnitude estimates with an expected accuracy of +50 to -30 percent. Detail for direct capital costs is in Appendix C. The order of magnitude costs have been prepared for the purpose of assessing the relative expense of a given alternative as compared with any other alternative and should not be considered as final estimates for negotiation. They are based on information available at the time of the estimate, information gathered from suppliers, and, to a large extent, on the experience and judgment of the study team. The final costs of the project will depend on actual labor and material costs, actual site conditions, final project scope, implementation schedule, and other variable factors.

ATTACHMENT 6

**NOTES:**

1 Costs are order of magnitude estimates with an expected accuracy of +50 to -30 percent.

2 This figure is based on Table 5-1 data. Detail for direct capital costs is in Appendix C.

Figure 5-1
Cost Estimates for Alternative 2, Source Removal
Residential Areas Site and Portions of the Kress Creek Site

ATTACHMENT 7

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V**

DATE: August 19, 1993

SUBJECT: Engineering Evaluation/Cost Analysis (EE/CA) Approval
Memorandum for the Kerr-McGee Residential Areas Site,
West Chicago, IL

FROM: Rebecca Frey *RL Frey*
Remedial Project Manager

TO: File

PURPOSE

The purpose of this memorandum is to document that U.S. EPA Region 5 (EPA) has decided to address contamination problems at the Kerr-McGee Residential Areas NPL site by non-time critical removal actions whenever possible. After numerous briefings between EPA staff and upper management, all participants agree that early action at this site is appropriate in accordance with the Superfund Accelerated Cleanup Model (SACM) philosophy. All parties also agree that any early action should be carried out as a non-time-critical removal action because a planning period of at least six months is available.

BACKGROUND

The Kerr-McGee Residential Areas site consists of an unknown number of residential and other properties contaminated with radioactive thorium mill tailings. The mill tailings, which originated at the now closed Kerr-McGee Rare Earths Facility in West Chicago, Illinois, were used as fill material during the 1930s and 1940s. Although Kerr-McGee conducted voluntary cleanups of over 100 properties in the mid-1980s, many other properties remain contaminated.

Additional site background information can be found in the Action Memorandum dated August 19, 1993, which requests authorization to conduct and procure funding for an EE/CA and RI/FS at the site, and in the Statement of Work for the EE/CA and RI/FS dated August 11, 1993, which provides direction to the Superfund contractor.

NCP CRITERIA FOR INITIATING A REMOVAL ACTION

Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan (NCP) sets forth the factors that should be used to determine whether a release constitutes a threat to public health or welfare or the environment. If such a threat exists, EPA may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release.

EPA has determined that the conditions present at the site constitute a threat to public health or welfare or the environment. This determination is based on, but is not limited to, the following factors:

1. actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; this factor is present at the site due to the existence of radioactive mill tailings in the soils of residential and non-residential properties, including areas which are or may be used for recreation or gardening.
2. high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate; this factor is present at the site due to the existence of radioactive mill tailings in surface and near subsurface soils that may migrate due to wind, erosion or deliberate human movement.
3. weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; this factor is present at the site due to the existence of radioactive mill tailings in surface and near subsurface soils that may migrate due to wind or erosion.

MANAGEMENT APPROVAL AND FUNDING TO CONDUCT AN EE/CA

As indicated above, EPA management has been very involved in the decision to conduct a non-time-critical removal action at this site, and thus to conduct an EE/CA. Management approval of the EE/CA and the funding to conduct the EE/CA will be obtained when the funding package for the EE/CA and RI/FS go through signoff.

ATTACHMENT 8

PLEASE NOTE

Because EPA already has widely distributed the August 1994 Engineering Evaluation/Cost Analysis (EE/CA) to the public and it is bulky in nature, EPA is not including a copy of the EE/CA herein.

Anyone desiring a copy of the EE/CA should contact EPA at either of the numbers shown below:

Rebecca Frey
Remedial Project Manager/
On-Scene Coordinator
312/886-4760

Eileen Deamer
Community Relations Coordinator
312/886-1728

ATTACHMENT 9

**WRITTEN RESPONSE TO SIGNIFICANT PUBLIC COMMENTS
ON THE AUGUST 1994
ENGINEERING EVALUATION/COST ANALYSIS--
KERR-McGEE RESIDENTIAL AREAS SITE AND PORTIONS
OF THE KRESS CREEK SITE
IN AND NEAR WEST CHICAGO, ILLINOIS**

November 1994

PURPOSE

This written response to significant public comments ("Responsiveness Summary") for the Engineering Evaluation/Cost Analysis (EE/CA) for the Kerr-McGee Residential Areas Site and Portions of the Kress Creek Site serves two vital functions: 1) it documents how significant comments have been considered during EPA's decision-making process for selecting a removal action at the Site and provides written responses to all significant comments on the proposed removal action; and 2) it provides EPA with information about the views of the public, government agencies, and potentially responsible parties (PRPs) regarding the proposed removal action and other alternatives that EPA considered in the EE/CA.

Comments received during the public comment period identified issues and concerns of the public, including the local community, the Illinois Department of Public Health (IDPH), the City of West Chicago, and Kerr-McGee Chemical Corporation (a PRP). Community comments are included in Section I below, IDPH comments are addressed in Section II, and City of West Chicago and Kerr-McGee comments are discussed in Sections III and IV, respectively. This document summarizes the public comments and provides general responses to them. Each individual comment is not specifically listed, but similar comments are grouped together and paraphrased. Lengthy comments also are not listed in their entirety, but are shortened and paraphrased to reflect the main intent of the comment. The complete text of comments received by EPA is contained in the administrative record for the Action Memorandum (or "Action Memo") to which this Responsiveness Summary is attached.

I. SUMMARY OF COMMENTS FROM THE LOCAL COMMUNITY

Comment: As residents on property that is on Kress Creek, it is our opinion that Alternative 2 - Source Removal be the route that the EPA take, except for Contingent Action C (recontamination prevention by installing steel sheet piling) which we would be completely adverse to. We would try to prevent the steel pilings from being installed. Our home is very near the Kress Creek bank. It is of utmost importance that as much of the contaminated soil be removed as early as possible. This will both protect us from further exposure to the radioactive material healthwise and help alleviate the financial strain of having the Thorium on our property. If the EPA chooses Contingent Action

C, and builds the steel barrier, that would cause an immense strain on the value of our property and our ability to enjoy that property. We believe the EPA will follow the action that is best suited for the people along the Kress Creek considering both health and ability to use the property in a way that will not cause financial or emotional strain.

Response: As described in the Action Memo, EPA has selected the source removal alternative (designated as Alternative 2 in the EE/CA) as the removal action that will be taken, and has NOT selected the recontamination prevention measures -- namely, steel sheet pilings -- that were evaluated in the EE/CA (Contingent Action C). As described in the Action Memo, however, EPA continues to evaluate other recontamination prevention measures (such as silt fences) against the criteria of effectiveness, implementability and cost, to determine if they are appropriate for this Site.

Comment: I support the plan proposed in the EE/CA. The plan satisfactorily addresses the concerns I have expressed over the years: (1) Begin the removal earlier than later. It is good that the plan calls for removal to begin before all contaminated locations have been identified. It is also good that contingencies for interim storage and an alternate staging area have been planned so that removal can proceed as quickly as all of the agreements have been approved. (2) Begin the removal from the residences along Kress Creek before a plan for the creek itself is in place. Owners need to have the freedom to use their property without fear to their health or economic well being. In addition, I support the plan for recontamination prevention: do nothing. The assumptions that there will not be significant flooding or that such flooding would significantly recontaminate the properties are consistent with my experience of living along the creek for 26 years and consistent with my understanding of how the thorium contamination would move. Trying to contain the creek in the Kress Creek site would only create larger problems downstream -- the water and perhaps contamination is going to go somewhere. Why send it further downstream?

Response: EPA appreciates the concern and support of the proposed removal action as expressed.

Comment: The EE/CA estimates the volume of contaminated soil from private properties at an average of 300 cubic yards per property. This estimate seems to be too excessive by a factor of 10. You would have to dig out the whole property eight foot deep to justify 300 cubic yards. What is the basis of that volume estimate? I know that some of the properties cleaned up in the mid-1980s didn't have anything close to that amount of material removed.

Response: The estimate of 300 cubic yards of material per property is based on the information from the Kerr-McGee residential cleanup effort in the mid-1980s. During that cleanup, Kerr-McGee removed 34,868 cubic yards of material from 116 properties, which averages out to about 300 cubic yards per property. This is not to say that each property had 300 cubic yards removed. Some properties probably had much less while others had much more.

Independent of the actual data from the previous cleanup effort, the following estimation method also results in the same volume estimate: Assume that the average property size is 13,000 square feet; assume that the average extent of contamination on each property is 25 percent of the surface area; assume that the average depth of contamination is 2 feet; and assume that the soil swells by a factor of 1.25 when excavated due to loss of compaction. $13,000 \text{ ft}^2/\text{property} \times 0.25 \times 2 \text{ ft depth} \times 1.25 \times 1 \text{ yd}^3/27 \text{ ft}^3 = 301 \text{ yd}^3 \text{ per property}$. Digging out a property to only 2 feet deep (not 8 feet) over only 25 percent of the property results in about 300 cubic yards.

Comment: Radon gas comes from the soil as a product of millions of tons of naturally-occurring radioactive ore. It is possible that the radon produced by these ores will seep into homes. To speak of thoron coming from the few tons of surface deposited spills of thorium by the Rare Earths Facility is scientifically unsupportable. All the printed material EPA handed out speaking about thoron is a total discredit. I am amazed how much it is stressed as if it was the major problem. The thoron gas cannot be a problem. I'm not saying that nothing is a problem -- if you eat thorium it is a serious problem to your health -- and I think the thorium should be removed. But don't confuse it with the thoron gas.

Response: Scientific literature and actual data indicate that thoron gas can be produced by the thorium mill tailings and seep into homes if there are significant deposits of mill tailings beneath or against the foundation of the home. During the Kerr-McGee cleanup effort in the mid-1980s, Kerr-McGee found at least one home that had significantly elevated levels of thoron due to mill tailings deposits beneath the home. Exposure to thoron is not expected to be the major problem at contaminated properties, however EPA believes that it is one possible route of exposure that must be considered.

Comment: In the 1980s, soil measurements and the removal of radioactive soil was performed, and properties declared clean knew where they stood. Now letters are being sent to people in areas indicated by fly-by airplane indications, producing fear and uncertainty about what will happen next. Why? The earlier measurements and removal of materials seems like a much more reliable technique than flying with an airplane and making some haphazard

judgment. I have more confidence in such, and would like to know the results of that measurement which was done in the 1980s.

Response: Access letters have been sent to approximately 1500 property owners located within EPA's study area for the Residential Areas Site. The study area is based on the results of a 1989 aerial radiological flyover conducted for the IDNS which shows, from the air, areas of elevated gamma radiation. The aerial flyover is being used only as an indication of where we should be looking for contamination, to define the boundaries of the study area. The only way to know which properties in the study area are contaminated is to test each one. EPA is in the process of testing each property by ground-level surveys, similar to what was done in the mid-1980s by Kerr-McGee, except EPA is using more stringent criteria to determine which properties get cleaned up. As a result, EPA may determine that some properties that were surveyed by Kerr-McGee in the mid-1980s and found not to need cleanup may now need some cleanup. EPA expects that the majority of properties in the study area will be found to be uncontaminated, but the only way to know for sure is to test each one.

Comment: Why is EPA looking at an alternative storage area? Most citizens had assumed that any storage from the community itself would be stored on the Kerr-McGee site. The Kerr-McGee site, which is already contaminated, is the most logical place to take the material.

Response: In the EE/CA EPA did not consider any other storage area besides the Kerr-McGee Rare Earths Facility. However, EPA developed another alternative in the EE/CA called "Off-Rare-Earths-Facility Staging Area" (Contingent Action B) in response to requests from the community that EPA have an alternative way, a "Plan B," to get the materials to the permanent disposal site, in case the Rare Earths Facility was not available. EPA listened to the community's concerns, and thus developed this option.

EPA agrees that the most logical place to take the materials is the Kerr-McGee facility. However, if Kerr-McGee for some reason does not conduct the cleanup of the residential areas and EPA conducts the cleanups, EPA may need another way to get the material to the permanent disposal facility. The "Off-Rare-Earths-Facility Staging Area" would NOT be a storage area, but rather would probably be an existing railyard where EPA could take properly packaged wastes for loading onto trains. EPA is not considering constructing a new waste storage area, nor is EPA currently considering constructing a new railspur.

Comment: If EPA decides to have off-site storage, can that be done as a unilateral decision by EPA on any piece of property in the community?

Response: As explained in the previous response, in the EE/CA EPA did not consider using any piece of property in the community to store excavated materials from contaminated residential properties. EPA is not considering storing material at any location besides the Kerr-McGee Facility. As discussed in the response to the previous comment, the "Off-Rare-Earths-Facility Staging Area" refers to an existing railyard where EPA could take properly packaged wastes to have them loaded onto trains. The extent to which EPA can unilaterally decide to use any property for a given use depends upon many, varied factors. As a **general matter**, EPA tries to obtain the voluntary permission of a **property owner** before using his/her property for activities related to a cleanup.

Comment: Will we still have thorium in our yards after the cleanup?

Response: There may be some small residual levels of thorium left after cleanup, but the cleanup criteria EPA has established for this Site in the November 1993 Action Criteria Document (Appendix A of the EE/CA) are very stringent. The cleanup criteria are protective of human health and the environment and set the maximum level of thorium that can remain after cleanup. In addition to the cleanup criteria numbers, EPA will be using the principle of cleaning to levels "As Low As Reasonably Achievable," such that cleanup will continue to levels even lower than the cleanup criteria when practicable.

Comment: The EE/CA document is kind of vague. Please explain this statement: "Under certain circumstances an alternative may be selected that does not meet all the regulatory requirements. However it must be protective of public health." (EE/CA, page 3-2.)

Response: The extent to which removal actions must comply with applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws is discussed in Section 3.4 of the EE/CA. Generally, the laws that govern the Superfund program state that removal actions are required to comply with all regulatory requirements to the extent practicable considering the exigencies of the situation, but that the action should be protective of human health and the environment. In order to be protective of human health, and to minimize the chance that further action would be needed in the future, any removal action at this Site must comply with the cleanup criteria in the Action Criteria Document, which are derived from federal and state environmental laws. As explained in Section 5.1.3 of the EE/CA, the recommended alternative is expected to comply with all ARARs.

Comment: Page ES-2 of the EE/CA says, "Radium specific activity in soil -- Dry soil concentrations of total radium must not exceed 5 picoCuries per gram above background levels averaged over areas of 100 meters square in any 15 centimeter depth." Can the average of 5 picoCuries over 100 square meters allow hot spots? If so, why?

Response: The federal and state regulations upon which the cleanup criteria for this Site were based specifically allow averaging the soil concentration over 100 square meters. Technically, this could allow small "hot spots" to exist. However, EPA has not included the averaging language in the discovery and characterization criteria, which are the criteria that EPA will use to identify contaminated areas for cleanup. EPA specifically excluded such averaging language from the discovery and characterization criteria in order to identify and cleanup such "hotspots." For the verification phase, which confirms that the cleanup (including cleanup of "hotspots") has been done properly, averaging over 100 square meters is allowed but not required. Even if averaging is used during the verification stage, EPA does not expect "hotspots" at levels of concern to remain at the Site after cleanup.

Comment: If Kerr-McGee agrees to do the off-site remediation, does Kerr-McGee need a permit to bring off-site material onto the Rare Earths Facility?

Response: Yes. Kerr-McGee needs a license amendment from IDNS and, possibly, the approval of other authorities to bring material to or store material on the Rare Earths Facility. Kerr-McGee already has applied for and obtained a license amendment from IDNS allowing Kerr-McGee to bring up to 15,000 cubic yards of material from the Residential Areas Site onto the Rare Earths Facility.

Comment: If Kerr-McGee obtains a license amendment to bring off-site material onto the Rare Earths Facility, then can material be brought onto the facility whether the cleanup is done by Kerr-McGee or EPA?

Response: The license amendment Kerr-McGee has obtained from IDNS allows only Kerr-McGee to bring material onto the facility. If EPA conducts the cleanup, EPA could not automatically use the Kerr-McGee facility. If EPA wanted to use the Kerr-McGee facility, EPA would need a separate approval from IDNS and any other applicable authority.

Comment: You already know of about 50 contaminated properties. Why can't EPA begin the remediation of those properties while it's identifying other properties?

Response: That is exactly the approach that EPA is taking. The cleanup of contaminated properties that already have been identified will begin before EPA has finished surveying all 1500 properties in the Site study area.

Comment: Page 4-3 of the EE/CA states, "There is no reason to believe that thoron reduction technologies will be substantially different from those of radon." I would like to see some data on that to prove it.

Response: There is not as much information available on thoron as there is on radon, because thoron has not been studied as much as radon. This is because naturally-occurring radon is a problem common to many homes across the country. Radon reduction technologies have been developed and are widely available because there is a large market for such technologies. Thoron, on the other hand, is not a common problem around the country. The reduction technologies discussed in the EE/CA have one of two purposes: they either (1) remove or dilute the gas from the air after the gas has entered the structure (e.g., ventilation in a crawlspace), or (2) prevent the gas from entering the structure (e.g., sealing interior/exterior cracks in foundation, or using soil gas ventilation outside the structure to divert the gas from entering the structure). Because of the nature of the radon reduction technologies and the physical similarities between radon and thoron, EPA believes, as stated in the EE/CA, that "there is no reason to believe that thoron reduction technologies will be substantially different from those of radon."

Comment: Page 6-4 of the EE/CA states, "Special situations which are not yet identified may arise during the course of the removal actions that are unusually difficult and cost prohibitive to reach the cleanup criteria." When these situations arise will there be public comment on it?

Response: Since the special situations referred to in the EE/CA are those which may arise at an individual property, not the Site as a whole, EPA does not believe that public comment would be appropriate. Such situations will be dealt with in the field as they are encountered, and EPA will make decisions on these situations in consultation with IDNS and, when appropriate, with the affected property owner. As explained in the EE/CA, the decision will be justified and documented, and the alternative action selected will provide adequate protection to human health and the environment.

Comment: I challenge EPA to come out with a first date of remediation of properties within the next thirty days. There is no reason at all that the EPA could not begin the remediation of properties simultaneously with the remediation of the factory site.

Response: Cleanups will begin in the Spring of 1995, and will continue concurrent with the remediation of the Kerr-McGee Rare Earths Facility.

Comment: If you were to use a spell-check with a computer on the EE/CA document, the most-used word would be "generally." There is nothing general about what is going on here. The EE/CA states, "In the previous removal, contaminated soil generally was limited to the top two feet of soil and often to the top one foot of soil." I would like to know then why so many properties were dug so deep to get this stuff out.

Response: The statement that the contamination "generally" was limited to the top two feet of soil in the previous removal is based on what was found, on the average, during the previous cleanup effort. This does not mean that no contamination was found deeper than two feet. In fact, there were several properties where the excavation was much deeper than two feet. Contamination may be found deeper than two feet in the upcoming cleanup effort. The main reason this statement is in the EE/CA is to serve as a basis for an estimate of the volume of material that might be encountered. It does not limit the depth of our excavations once the cleanup begins.

Comment: Page 6-7 of the EE/CA states, "Measures taken to protect the worker will also protect the general public during the removal action." I would like to ask either the EPA or Kerr-McGee where we can get our white suits.

Response: The referenced statement on page 6-7 of the EE/CA was not referring to protective clothing. Rather, as described in the sentence following that statement in the EE/CA, "These measures include standard posting protocol, dust suppression, and health physics coverage." EPA realizes that the general public will not be wearing "white suits." However, dust suppression techniques and the other measures mentioned will protect both workers and the general public.

Comment: I own some properties in the West Chicago area. If I want to sell them, would I be able to sell them now or not? I received a letter from EPA requesting access to my property. What does it mean?

Response: If a property owner received a letter from EPA requesting access to her or his property, it does NOT mean that the property is contaminated. It only means that the property is located in EPA's study area for the Site, along with approximately 1500 other properties, the majority of which probably are uncontaminated, and that EPA will be testing the property. If the EPA study indicates that the property is not contaminated at levels of concern, the owner may receive an EPA letter to that effect. If the property is contaminated at levels of concern, it will be cleaned to the levels indicated in the Action

Criteria Document and the owner may receive a letter from EPA confirming that fact. Some lending institutions may require that property be tested prior to their decision on whether to underwrite a loan, but this is not an EPA requirement.

Comment: The properties that I own are rental properties. What are my alternatives if my tenants decide to move out while you're testing and digging the property? Once you start digging on a property, how long will it take? How long will the property be affected?

Response: The testing of a property takes only several hours over the course of a few days, during which time different EPA workers will make measurements and take samples from the property. If EPA determines, based on the test results, that the property needs to be cleaned up, the time needed to do the cleanup at that property could be anywhere from a few days to a few weeks, depending on the amount of contamination. A small hotspot, for instance, would only take a day or two to clean up and restore, but a much larger excavation would take longer. Cleanups will begin in the Spring of 1995 on the most highly contaminated properties, and will continue throughout 1995 and possibly into 1996, depending on the number of contaminated properties that are found. The exact schedule for when specific properties will be cleaned up has not been set yet. EPA can assist property owners and tenants by providing information to them regarding the cleanup. The cleanup will be done in such a way as to be protective of all affected residents.

Comment: Is EPA headquarters or Department of Justice review and approval of the EE/CA document required before EPA can make a final cleanup decision?

Response: No. Neither EPA headquarters nor the Department of Justice is reviewing and/or approving the EE/CA document. The Action Memo is EPA's final removal action decision and does not require EPA headquarters or Department of Justice Review, either.

Comment: Kerr-McGee intends to be done with the factory site cleanup in three years. It is very conceivable that they're going to be cleaned up, their facility is going to be packed up, and they're going to be out of here before you ever get to square one with removal of these residential properties. And then your cost estimates show that in the event you have to build a whole new facility and go through all of this permitting and all of this time to duplicate what Kerr-McGee just spent all this time doing, it's only going to cost you 1% more? How did you arrive at these figures?

Response: The cleanup of the Residential Areas Site will begin in the Spring of 1995. How long the cleanup will take depends on the number of properties

that are found to be contaminated, but it is highly likely that the cleanup of the Residential Areas Site will be completed before the cleanup of the Kerr-McGee Rare Earths Facility is completed. The cost estimates in the EE/CA do not include the costs of building a whole new facility, because EPA would not build a whole new facility. The 1% figure is the additional cost, over and above source removal, of EPA having to haul the properly containerized material to an already existing railyard where the containers would be placed on trains for transport to the permanent disposal facility. This alternative, known as "Contingent Action B -- Off-Rare-Earths-Facility Staging Area," might be necessary in the event that Kerr-McGee does not conduct the cleanup and the cleanup is conducted instead by EPA. The alternative consists of simply using an already existing railyard, not constructing a new railspur and materials handling facilities (as Kerr-McGee is doing at its facility).

Comment: I would like to see a lot tighter breakdown on the cost estimates than just telling us that cleaning up fifty properties would cost \$22 million.

Response: The cost breakdown information is contained in Section 5.3 of the EE/CA. Table 5-1 and Figure 5-1 (pages 5-14 and 5-15, respectively) in the EE/CA provide a breakdown of costs for each of the four different volume scenarios for the following categories: health & safety; transportation; excavation, backfill and restoration; disposal; miscellaneous; overhead and profit; mobilization, bonding and insurance; contingency; and indirect capital costs (i.e., engineering and design, legal and administrative, licensing and permitting). This information also is shown in Attachments 5 and 6 of the Action Memo.

Comment: It may be fruitful to have another community meeting prior to issuance of EPA's Action Memorandum.

Response: The vast majority of commenters on the EE/CA, while still wanting to discuss various issues related to the cleanup, appear to support the action that was proposed by EPA and selected in the Action Memo, namely, the Source Removal alternative. EPA will continue discussions with the public on many issues, but does not believe that another community meeting is necessary before issuance of the Action Memo.

Comment: EPA recently sent out access letters to people who own property. Do these people have the authority to refuse EPA access to their property for testing?

Response: Some property owners may deny EPA access to their property. However, EPA has some authority under the Superfund law to gain access to properties to implement the Superfund program. If a property owner refuses access, EPA would exercise that authority in appropriate circumstances. EPA

would prefer that property owners willingly give access for testing and cleanup of their properties.

Comment: I'm not sure whether I believe that property owners should be able to refuse EPA access or whether EPA should go out and make sure every property is tested. But does EPA know how it will deal with this issue? Will EPA make sure every property is tested, even if people refuse access? If people refuse access, does that mean that there's a chance that properties will be left uncleaned up?

Response: EPA will make a decision on this issue if and when it arises. One factor that EPA must consider is that if a property is contaminated and not cleaned up, the contamination may affect many future generations in addition to the current property owner.

Comment: Does the EPA need some sort of a license from IDNS to bring material onto the Kerr-McGee factory site for shipment as a staging area?

Response: As owner of the facility, Kerr-McGee would be the one to apply for and obtain a license amendment to use the Kerr-McGee facility as a staging area for shipment of wastes no matter who sent the material to the facility.

Comment: If Kerr-McGee doesn't do the cleanup, does EPA need a license to use some other place as a staging area for shipment of the wastes? Would the material need to be packaged somehow?

Response: If EPA conducts the cleanup, EPA would most likely use a staging area for shipment of wastes other than the Rare Earths Facility (as described in the EE/CA as Contingent Action B -- Off-Rare-Earths-Facility Staging Area). If the wastes were handled in bulk form, the staging area might need to be licensed for such activities. However, if the wastes were properly packaged, a license would not be required according to IDNS. If EPA were to conduct the removal action, EPA probably would package the wastes immediately after removal and take the packaged wastes to a staging area where they would be loaded onto trains.

Comment: The people who live along Kress Creek are on well water. Is it possible that their well water could be contaminated? If so, where could they send samples to be analyzed?

Response: Because the thorium is very insoluble, contamination of water is not expected to be a problem. IDNS has tested many residential wells and has never seen a problem. If residents want their water tested, the IDNS will conduct such tests. Contact Dave Ed at IDNS at 217-786-6362.

Comment: For material that is removed from contaminated properties and stored somewhere, what plans will there be to catch rain water that could potentially become contaminated? What would happen to the rain water?

Response: Whoever conducts the removal action (whether Kerr-McGee or EPA) will prepare a Work Plan that describes all the details of how the removal action will be accomplished. Details such as this have not been worked out yet but will be provided in the Work Plan.

Comment: The conceptual-level description of interim storage on page 4-19 of the EE/CA states, "The excavated waste volume that accumulates in storage in one year duration is 50% of the total projected volume." What is the total excavation volume?

Response: The total excavation volume is unknown at this time, which is why the EE/CA estimated costs for four different volume scenarios. Therefore, the 50% figure represents a different volume for each scenario. For the purposes of estimating costs only, the EE/CA assumed that, because Illinois law imposes a storage fee on Kerr-McGee, 50% of the total projected volume would be in storage at the Kerr-McGee facility.

Comment: Who is going to address the contamination by the EJ&E railroad tracks?

Response: The contamination under the EJ&E railroad tracks on the west side of the Kerr-McGee facility, and any other contamination that leached away from the Kerr-McGee facility, will be dealt with by IDNS as part of the closure activities at the facility.

Comment: When the cleanup of all the off-site areas is finished, for how many years and specifically in what ways will you retest the area to make sure you haven't missed anything? Will there be something in place to protect us in the future in case you don't find all the contaminated areas, and someone, for example, has to dig a foundation and there's a hotspot there?

Response: EPA realizes that these are issues which must be addressed. Completion of all the off-site areas is still a few years away, so final decisions on what will be done afterwards have not yet been made. EPA and IDNS have discussed the possibility of conducting another aerial radiological flyover of the West Chicago area after all the cleanups are complete, as a final check to see if any contamination was missed. Mechanisms to identify contamination during future construction activities may also be put into place. EPA, in consultation with IDNS and other appropriate entities, will address these issues formally in a future document available for public comment.

Comment: The fact sheet that EPA passed out talks about different routes of exposure. Given the specific nature of the contaminants, have you done any prioritization of what the risk factors are from those different routes of exposure? It would appear that the greatest individual risk factor for any one person in a residential area would have to be ingestion of material.

Response: The fact sheet listed possible routes of exposure without prioritizing them. Based on a preliminary look at current Site conditions, EPA believes that direct exposure to gamma radiation presents the greatest likelihood of risk because we know that people currently are being exposed by this route. However, if any of the contaminated areas are not vegetated, ingestion of contaminated soils would be more likely to occur and would present a significant risk to those individuals.

Comment: To illustrate situations where hotspots might be left behind, EPA has given the example of a tree where there is a hotspot bound up in the roots. My concern is that this contamination will be with us for a very long time. What happens if someone later on decides to cut down the tree and dig up the area around the tree, and people can then be exposed to the contamination? I want to reiterate my concern about leaving any hot spots behind, because it will be with us forever.

Response: That is a valid concern. In determining whether any contamination may remain on-Site at levels of concern, EPA will take into account the fact that any contamination left behind may expose future generations. If a decision is made to leave any specific hotspots behind, EPA will require a deed restriction, lien or other legal instrument to notify future purchasers and the public that the contamination is still there. This instrument will include details about the location and amount of the contamination.

Comment: The EE/CA says something about remediation taking eighteen months. Since it will take you two years to complete the testing of all the residential properties, does this mean it will take two years plus another eighteen months? What is the total timeframe for the residential cleanups?

Response: The total timeframe for removals is unknown at this time because the number of contaminated properties is unknown. Page 3-5 of the EE/CA stated that "The estimated duration of the removal implementation is less than 19 months" and that "...this duration will be revised depending on the number of contaminated properties and volume of contaminated soils found at the site..." Earlier on the same page, the EE/CA provides that "...the completion of the removal implementation...is estimated to occur within several months of the completion of discovery activities, depending on the number of properties that are found to need removal action." Because the testing of some properties

and the cleanup of other properties will be going on at the same time, it will not take an additional 18 months after all the testing is done to complete cleanup of the entire Site. However, as stated above, an exact timeframe is impossible to give, because the size of the removal project is yet to be determined.

Comment: EPA sent me a letter saying it wants to test my yard. Fine, I will sign it, but I want it tested now. Don't make me wait two years to find out I have hot spots in my backyard with my children playing out there.

Response: Because of the large number of properties to be tested (approximately 1500), EPA believes it necessary to conduct testing activities over two "construction seasons." Approximately half of the properties will be tested in 1994, and the other half will be tested in 1995. EPA will attempt to contact property owners at least one week in advance of the testing. If residential property owners wish to have their properties tested before that time, IDNS has indicated that it will conduct a screening survey at the owner's request. To request an IDNS screening survey, contact Dave Ed at 217-786-6362.

Comment: I have a yard that is contaminated, and because I have four children I poured concrete over most of my yard. Now I received a letter from EPA saying you are going to come out and check my yard. Since the majority of it is covered with concrete now, how will the testing be able to detect the contamination that is underneath? How will you address that? IDNS originally tested my yard, and they have the data that shows it is contaminated.

Response: EPA probably will not be able to detect the contamination through the concrete. However, IDNS data is available from the property before it was covered with concrete and EPA will use the IDNS data in making cleanup decisions.

Comment: Regarding the "ALARA" concept (As Low As Reasonably Achievable), what in layman's terms is "easily achievable" so we can derive some understanding of what that means?

Response: In layman's terms, the concept of "As Low As Reasonably Achievable" means that excavation will not necessarily stop when the numerical cleanup criteria have been reached, but excavation will continue to lower levels if EPA determines that it is practicable. For example, if excavation has reached the numerical criteria and it would require excavation of only a few more shovelfuls of soil to remove the contamination to near background levels, EPA would consider removing the additional soils "reasonably achievable." EPA would not consider tearing down the

foundation of a house to remove an insignificant amount of contamination located below the foundation to be reasonably achievable.

Comment: How are the people doing the cleanup going to know when it's clean enough for them to stop digging?

Response: Cleanup levels were established by EPA in the Action Criteria Document. If Kerr-McGee conducts the cleanup, its contractors will be testing contamination levels in the open excavation, and when they think they have reached the cleanup criteria, will notify EPA. However, EPA will independently confirm Kerr-McGee's results. IDNS will be doing the final testing in the open excavation for EPA, and EPA will use the IDNS data to decide whether Kerr-McGee's contractors can stop digging or whether they will need to excavate more soil. Only after EPA tells Kerr-McGee's contractors that they have reached the cleanup criteria (based on IDNS data) can they backfill the excavation with clean soil and restore the property.

Comment: Is it true that the EE/CA determined that soil washing is not being considered for this site as a way to reduce the volume of contaminated soil because the process is not presently sufficient to reduce the contaminant concentration to levels below the cleanup criteria for a significant fraction of the waste?

Response: Page 4-10 of the EE/CA states that "Although soil washing may be proposed for the Rare Earths Facility materials, volume reduction of soils via soil washing from the Residential Areas site and portions of the Kress Creek site is not retained for further consideration because the process is not presently sufficient to reduce the contaminant concentration to levels below the soil concentration action criteria for a significant fraction of the waste." As stated on the same page in the EE/CA, additional pilot testing would need to be conducted before EPA would give serious consideration to soil washing for the materials from this Site. Based on current information, soil washing is not retained for further consideration at this time. However, EPA will continue to monitor the progress and feasibility of this and other treatment technologies.

Comment: I would like to know the status of my property. I have let both EPA and IDNS on the property several times to take readings, and have never heard anything regarding "hot spots" and/or contamination. I think it's about time I heard something from you.

Response: EPA has not yet sent the results of tests to the property owners, and hopes to do so by the end of 1994 for all properties that had complete testing done in 1994. In the future, EPA intends to provide test results to property owners as soon as possible after the results are verified.

Comment: I want to thank EPA for giving us a forum for our input. Not all agencies do that. I also want to encourage EPA to continue these efforts.

Response: Thank you for your comment and encouragement.

II. SUMMARY OF COMMENTS FROM ILLINOIS DEPARTMENT OF PUBLIC HEALTH (IDPH)

Comment: IDPH agrees with the USEPA that immediate removal is appropriate for the wastes in residential areas. In the Draft Public Health Assessment for the Kerr-McGee Radiation Areas, one of the recommendations was that actions be taken to reduce human exposure in residential areas.

Response: IDPH support of the removal action is noted. In fact, the findings of the Draft Public Health Assessment were cited in the Action Memo.

Comment: IDPH is pleased that the cleanup plans of USEPA include evaluating nonradioactive contamination, including lead. It is important that all chemicals of concern are addressed.

Response: In addition to lead, an EPA pilot study at the Site is evaluating other nonradioactive contaminants, namely barium and chromium.

Comment: Page 2-1 of the EE/CA incorrectly states that the Rare Earths Facility extracted thorium and/or other elements from fluorspar. Fluorspar is the primary source of hydrofluoric acid, which was one of the primary chemicals used to extract thorium and rare earth materials from the ore. Fluorspar also may have been a source of lead found in the wastes, so the levels of radionuclides and lead may not be well-correlated.

Page 2-1 of the EE/CA does not contain a complete description of the Rare Earths Facility operations. Other materials such as used mantle scraps and minor ores were also processed. Bastnasite ore, which contains rare earths but does not contain thorium over background levels, was first processed in 1954, after tailings were used for fill in the vicinity. Consequently, wastes from its processing should not be present in residential areas, unless they were carried by runoff through the storm sewer discharge to Kress Creek and deposited in floodplain soils.

Page 2-1 of the EE/CA should state that the percentages that are given are for the monazite ore, since bastnasite ore does not contain thorium above background levels.

Response: The description on page 2-1 of the EE/CA was not intended to be a complete description of the Rare Earths Facility operations, but rather just an overview. EPA does not disagree with any of these comments or clarifications. EPA does not believe that the EE/CA requires revision at this time, as none of these changes would affect our evaluation of the cleanup alternatives or result in a change in the selected removal action. These comments will be noted for future reference.

Comment: Page 2-2 of the EE/CA could be updated with more recent and accurate information on the glacial till geology of the Kerr-McGee Facility than the Law Engineering (1981) report, which was heavily criticized by USEPA and numerous state and local agencies. Other references include: IDPH Draft Public Health Assessment for the Kerr-McGee Radiation Areas (1993), the NRC Supplement to the Final Environmental Impact Statement (1989), and well logs available from the Illinois State Water Survey (ISWS), Champaign (for areas around the Kerr-McGee Facility). While the layers described in the EE/CA are generally present at the Kerr-McGee Facility, there are some exceptions and data gaps. [The comment then went on to give a detailed description of the exceptions and data gaps regarding the geology of the area.]

Response: The discussion on page 2-2 of the EE/CA was not intended to be a complete description of the geology of the Rare Earths Facility, but rather just an overview. EPA does not believe that the EE/CA requires revision at this time, as none of these changes would affect our evaluation of the cleanup alternatives or result in a change in the selected removal action. These comments will be noted for future reference.

Comment: Page 2-3 of the EE/CA misquotes Frame (1984) by saying that in the study area, the depth of the West Branch of the DuPage River is 2 to 5 feet deep. Frame (1984) did not give the depth of the West Branch of the DuPage River, but said it is only slightly deeper than Kress Creek (average depth 30 cm {about 1 foot} and rarely over 60 cm deep {about 2 feet}). The USEPA RI (1986) stated the depth of the West Branch of the DuPage River is about two to three feet by the West Chicago Regional Wastewater Treatment Plant. However, the depth of the river is variable and during periods of low flow (July into fall), it is frequently only a few inches deep in riffle areas. In fact, in late summer, canoeing on the river is usually difficult because of shallow water.

According to Frame (1984), which was again misquoted on page 2-3 of the EE/CA, the average depth of Kress Creek is 30 cm (about 1 foot), and it is rarely over 60 cm (about 2 feet) deep. Also, some of its banks are much higher than two feet, particularly about 900 to 1,250 meters south of the storm outfall.

Response: The discussion on page 2-3 of the EE/CA is a general description of the surface water hydrology of the area. The exact depths of the river and creek did not affect the selection of the removal action for this Site.

Comment: Regarding statements on page 2-6 and 2-7 of the EE/CA, the drilling of shallow wells has helped, but not solved the problem of radium in the deep groundwater used by the City of West Chicago. [The comment went on to give analytical results of water sampling from 1990-1992, which showed that there have been exceedances of regulatory limits for alpha activity and radium in water.] While this radium is natural and not related to the Kerr-McGee wastes, for users of the municipal water supply, it would add to the risks from any exposure to tailings.

Response: This information will be noted for future reference. However, please note that any risk assessments for this Site will account for only Site-related risks.

Comment: Page 2-18, 2-19 and 2-26 of the EE/CA list contaminant release mechanisms and exposure pathways. The ingestion of contaminated fish and frogs (one person told me that their family frequently ate the legs of frogs from Kress Creek) is another possible exposure pathway, although, because of limited water solubility and bioavailability, bioaccumulation of lead and radionuclides is probably not of concern. Furthermore lead, radium, thorium, and uranium tend to accumulate in bone, which is the last part of a fish anyone would wish to eat. Also, for this reason, it is very important to use the analyses of filets rather than whole fish for any human risk assessment of lead or these radionuclides in fish. Whole fish sampling would produce biased results which are not relevant to human consumption.

Response: The EE/CA document evaluates the Residential Areas Site and the portions of the Kress Creek Site that are in the floodplain and are residential properties. The EE/CA document does not address the actual creek or river. Ingestion of fish and frogs is therefore not relevant to the EE/CA document. EPA will address the Kress Creek contamination in a later action.

Comment: On page 2-22 of the EE/CA, please state that the genetic effects of radiation are important because the damage to DNA is what initiates radiation-induced cancer. In addition, the teratogenic effects of radiation can be quite serious, given a sufficient dose at the critical time of gestation (8 to 25 weeks for humans, with 8-15 weeks the most sensitive; the data also suggest a threshold between 20 and 40 rad; BEIR V, 1990). Instead, please say that teratogenic effects have been observed only at much higher doses than possible from exposure to the Kerr-McGee waste tailings.

Response: These comments are noted for future reference. Since teratogenic effects have been observed only at much higher doses than possible from exposure to the Kerr-McGee wastes, including more detailed information in the EE/CA was deemed unnecessary.

Comment: Regarding page 2-22 of the EE/CA, it is important to note that the radiological standards for uranium are based on its chemical toxicity to the kidney and not radiation-induced carcinogenicity, which poses a lower risk.

Response: This comment will be noted for future reference. EPA does not believe that the EE/CA requires revision at this time, as this change would not affect our evaluation of the cleanup alternatives or result in a change in the selected removal action.

Comment: On page 2-23 of the EE/CA, saying "...with the carcinogenicity being the limiting effect" is very ambiguous. I think you meant to say that in general, carcinogenic chemicals pose unacceptable cancer risks at lower concentrations than are associated with non-cancerous toxic effects. This is true only in general. For example, the radiological exposure standards for uranium are based on non-cancerous kidney toxicity rather than radiation-induced cancer.

Response: This interpretation of the sentence is correct.

Comment: Regarding page 2-23 of the EE/CA: In animals, cancers can occur less than two years after exposure. In general for humans, however, chemical- or radiation-induced cancers occur 10 or more years after exposure. In epidemiologic studies, when a cancer is observed only one or two years after exposure, the general conclusion is that it was not caused by the chemical or radiation being investigated.

Response: This comment is noted for future reference.

Comment: On page 2-24 of the EE/CA the sentence that reads "Generally, if an exposure to a chemical exceeds a chronic RfD, adverse toxic effects are likely to occur" is untrue and MUST be eliminated. As stated correctly earlier on the same page, a RfD is an estimate of the daily ingestion of a chemical that is likely to be without adverse non-cancerous health effects. The reverse, that anything over the RfD is likely to cause adverse health effects, is absolutely not true! A RfD is an extremely conservative value meant to protect sensitive members of the public. For example, if a no-observed adverse effect level (NOAEL) is reported for a rat (which may easily be over an order of magnitude less than the lowest observed adverse effect level {LOAEL}), this value is divided by ten to be conservative in extrapolating from animals to humans. It is then further divided by ten to allow for human variability. It can also be divided

by other uncertainty factors for various reasons, including uncertainty of the data, use of a LOAEL instead of a NOAEL (divide by 10), and route-to-route extrapolation (generally divide by 10). The result is a RfD with a large safety margin. To say otherwise, particularly for a case like Kerr-McGee where public concern is high, may lead to increased and unjustified fears.

Response: According to Superfund Risk Assessment Guidance, the RfD is the level of exposure below which it is unlikely for even sensitive populations to experience adverse health effects. If the exposure level exceeds the RfD, there may be a concern for potential noncancer effects. EPA agrees that the sentence in question could have been worded slightly differently, but does not believe that this difference would affect our evaluation of the cleanup alternatives or result in a change in the selected removal action.

Comment: Regarding the discussion of lead on page 2-24 of the EE/CA: A common source of lead and the most common cause of lead poisoning is lead paint. In these homes, the inhalation of lead dust may be more important than the ingestion of paint chips. Soil along homes with exterior lead paint and along busy roadways often has high lead concentrations in the upper inch of soil. Lead is relatively immobile in the environment and tends to remain at the surface of the soil (or where it is deposited). Children 6 months to 6 years old are the most susceptible to lead because of greater absorption after ingestion, slower elimination, frequent hand-to-mouth activity, and greater sensitivity of their developing nervous systems. Lead absorption is increased by inadequate intakes of calcium, copper, iron, phosphorus, or zinc, as well as by fatty foods.

Response: This information will be noted for future reference.

Comment: Regarding page 2-27 of the EE/CA, the cancer slope factors for nonradioactive chemicals are 95 percent upper confidence limits, but those for radionuclides are actual risk estimates.

Response: The EE/CA intended to make a general statement that cancer risk factors are often (not always) upperbound confidence limits. The cancer slope factors for radionuclides are actual risk estimates.

Comment: Regarding page 2-27 of the EE/CA, the USEPA Focused Risk Assessment used slope factors from the HEAST tables, which were based on the BEIR III (1980) report. In 1986, the dose estimates for atomic bomb survivors were revised downward, which resulted in new risk estimates about four to eighteen times higher for various cancers. The USEPA has just released new cancer slope factors based on the newer information. The risk estimates for exposure

to the Kerr-McGee wastes should be re-calculated using the new slope factors, and the revised estimates should be used for clean-up decisions.

Response: The Focused Risk Assessment used the cancer slope factors from the HEAST tables that were current at the time the assessment was conducted. Since that time, EPA has released new cancer slope factors based on newer information. If and when EPA calculates or recalculates risks for this Site, the most current EPA slope factors would be used. Recalculating the risks for purposes of the EE/CA would not change EPA's evaluation of cleanup alternatives or selection of the removal action, therefore EPA is not recalculating the risk estimates at this time.

Comment: Regarding pages 3-3, 3-4 and 3-6 of the EE/CA, there can be significant differences in the non-cancerous health risks of chemicals to children and adults, and this must be considered in developing cleanup criteria. According to the ATSDR Public Health Assessment Guidelines, typical soil ingestion rates of children and adults differ considerably: children ingest 200 mg of soil per day (mg/d), a pica child ingests 5,000 mg/d, and an adult consumes 100 mg/d. Children also have lower body weights, so the same intake would result in a greater dose. Consequently, given the same contaminant concentrations, children receive significantly higher doses of soil pollutants than adults. For non-carcinogenic effects, the doses of both children and adults should be calculated to determine if either exceeds the RfD or any other health-based criterion. The level of a chemical may not exceed an acceptable intake for an adult, but it may be over that for a child. Furthermore, some chemicals (e.g., lead, mercury) are much more toxic to children than adults. These factors must be considered when establishing cleanup criteria.

Response: The pages in question deal with the development of Preliminary Removal Goals (PRGs) for nonradiological contaminants. PRGs are not cleanup criteria, but are used as a screening tool to identify chemicals and media of concern when the Site has not been fully characterized. The methods used to develop the PRGs, including the use of an age-adjusted soil ingestion rate, is entirely consistent with Superfund guidance for development of risk-based preliminary remediation goals. EPA currently is investigating whether nonradiological contaminants (such as metals) are present at the Site at levels of concern. The PRGs developed in the EE/CA will be used as preliminary numbers to evaluate whether the nonradiological contaminants should continue to be considered contaminants of concern. If the nonradiological contaminants are present at levels above the PRGs and a risk assessment is conducted to establish risk-based cleanup criteria for those contaminants, an assessment based on the actual Site data would be conducted. Such a risk assessment may include a separation of the risks to children and the risks to adults. However, such a separation is not necessary for the development of PRGs.

Comment: Regarding page 4-6 of the EE/CA, another reason for rejecting institutional controls as an alternative is that the half-life of thorium-232 is about 14 billion years and lead remains toxic forever. It is not reasonable that institutional controls would persist indefinitely.

Response: Although this was not specifically stated in the EE/CA, EPA has taken this into account while selecting the removal action.

Comment: Regarding page 16 of Appendix A of the EE/CA (the Action Criteria Document), which discusses outdoor radon concentrations: In 1982, Jensen et al. (1983) found that radon-220 and radon-222 were not elevated along Kress Creek, and radon levels were generally not elevated around the Kerr-McGee Facility. Radon-220 and radon-222 concentrations around the Kerr-McGee Facility should be even lower now, since the waste piles were covered with asphalt in 1983 to reduce radon progeny emissions. At Reed-Keppler Park, radon-220 and radon-222 levels were not elevated outside of the fenced area (Booth et al., 1982; Frigerio et al., 1978).

Response: EPA assumes from this comment that IDPH agrees with the decision that was made in the Action Criteria Document (which was finalized in November 1993) not to use outdoor radon/thoron as one of the criteria for the Site.

III. SUMMARY OF COMMENTS FROM THE CITY OF WEST CHICAGO

Comment: Initially, the City agrees with EPA's conclusion that source removal is the preferred alternative for both the Residential Site and the identified portions of the Kress Creek Site. However, the City does have serious concern with several issues (discussed in comments below).

Response: The City's support of the preferred alternative is noted.

Comment: In the EE/CA, EPA identifies the principal radioactive contaminants of concern as "thorium, uranium, and associated decay products such as radium, radon, and thoron." Yet EPA has structured its entire investigation and cleanup program on detecting certain *radium* (no thorium or uranium) values. By detecting total radium values for Radium 226 (Ra-226) and Radium 228 (Ra-228), EPA assumes it is also collecting accurate information on the quantity of Uranium 238 (U-238) and Thorium 232 (Th-232) that may be present. The basis for EPA's assumption is premised on the assumption that all of these radionuclides are in "secular equilibrium." This assumption means that if EPA detects Ra-228 at 5 pCi/g, EPA will assume that Th-232 is also at 5 pCi/g; similarly, if Ra-226 is detected at 5 pCi/g, EPA will assume that U-

238 is also at 5 pCi/g. Unfortunately, the available data (collected by Kerr-McGee) strongly suggests that Ra-228 is *not* in secular equilibrium with Th-232; nor is Ra-226 in secular equilibrium with U-238.

The consequences of failing to address this potential lack of secular equilibrium are serious. EPA is currently undertaking an expensive field survey of West Chicago residences based solely on radium values. EPA may declare a residence to be uncontaminated based on radium values -- when the investigation may have failed to examine and detect unacceptably high and dangerous levels of Th-232 and U-238 at that same home. Our citizens have already been through one flawed "clean-up" in the mid 1980s. We don't need another flawed clean-up based on non real-world assumptions which will leave the health and property values of our citizens significantly at risk. The City has raised this issue repeatedly with EPA. The City asks EPA to immediately develop and conduct an investigation to determine if highly reliable correlations (linking the measured value of Ra-228 with Th-232 and the measured value of Ra-226 with U-238) can be developed. In the absence of such correlations, we ask that EPA's residential site sampling program be revised -- and to the extent necessary redone -- to actually measure for these radionuclides.

EPA does acknowledge in the EE/CA that certain of the testing done for other NPL Sites in West Chicago will be pertinent to the question of whether secular equilibrium exists or not. However, that information may not be available until after locations within the Residential Site are investigated or remediated. Further, because during different time periods, different isotopes were being recovered at the Rare Earths Facility, the data on the other NPL sites may not be relevant to conditions in the Residential Site. The City believes that the assumption of secular equilibrium must be tested and verified before actual removals are undertaken.

Response: EPA is aware of the City's concerns on the issue of secular equilibrium and has made a commitment to investigate and resolve the issue. Originally, EPA intended to use data collected from the other 3 NPL Sites to address this issue, as the quick-turnaround lab analysis being performed by IDNS for EPA at the Residential Areas site provides values for Ra-228 and Ra-226 only. Samples from the other NPL Sites are being analyzed by EPA's National Air and Radiation Environmental Laboratory (NAREL), and the resulting data will include measured values of Th-232, U-238, Ra-228 and Ra-226. However, because of delays associated with the analysis of the samples from the other 3 sites and the question regarding whether data from the other NPL Sites is representative of the Residential Areas Site, EPA has decided to collect samples from the Residential Areas Site and analyze them for Th-232, U-238, Ra-228 and Ra-226. EPA will expedite the analysis of these samples

and will share this information with interested parties as soon as validated data becomes available. At that time EPA will initiate any necessary changes to the removal action investigations or other activities.

Comment: In oral presentations to the community, EPA has consistently stated that when contaminated property was discovered, the property would be cleaned to background. Such a practice would be consistent with Kerr-McGee's mid-1980s practice of cleaning to background at locations it determined to be contaminated. EPA has stated to the community that the basis of cleaning to background was based on the "ALARA" principle, and that the exceptions to not cleaning to background would be rare and only based on extreme physical impracticability. Finally, EPA has orally stated that the determination of whether an excavation was clean to background would be made *before* the excavation was backfilled. These oral representations appear to be inconsistent with written documents prepared by EPA including the EE/CA. Please confirm in a revision to the EE/CA or other formal documentation that our understanding of your oral commitments to the residents of the City are correct.

Response: In oral presentations to the community, EPA has endeavored to be consistent with its written position, i.e., that properties will be cleaned to meet, at a minimum, the soil concentration criterion (5 pCi/g above background for combined Ra-228 and Ra-226) that has been established for this Site, and in addition, that the "ALARA" principle will be applied. The intent in applying ALARA to cleanups is to go as far below the soil concentration criterion as is reasonably achievable, as explained in the Action Criteria Document (which contains the cleanup criteria for the Site), finalized by EPA in November 1993. The primary cleanup criterion for the Site is 5 pCi/g above background, with application of ALARA. Measurements to determine compliance with this criterion will be made by IDNS/EPA in the open excavation, prior to backfilling. (Another criterion in the Action Criteria Document requires that, after backfilling, gamma exposure rates must not exceed background as measured 1 meter above the ground.) While in practice the 5 pCi/g criterion in conjunction with the ALARA criterion may result in a cleanup at or near background at many locations, EPA will not require that all contamination be cleaned to background. The Superfund law does not require that cleanups be to background levels. EPA believes that the numerical and ALARA criteria described in the Action Criteria Document are protective of human health and the environment and comply with applicable laws.

Comment: Throughout the discussion of alternatives, EPA has ignored the question of the City's authority regarding shipments of so-called "off-site" material to the Rare Earths Facility. Neither Kerr-McGee nor EPA can bring off-site wastes to that Facility unless and until they receive explicit written permission from the

City. We emphasize that the City has agreed to allow such shipment -- but only after a formal application for zoning and other approvals have been received and acted upon by the City, and only after we have received enforceable written assurances that all the material will be moved within the six month deadline imposed by the City. As of this date (9/19/94), Kerr-McGee has not filed a complete and sufficient application for such approvals.

Response: All off-site activities must comply with all applicable federal, state and local laws, including City laws.

Comment: In EPA's discussion of ARARs, EPA consistently ignored a State statute which calls for complete cleanup of the off-site areas within four years after commencement of construction. That statute (420 ILCS 42/1 et seq.) is a binding substantive State law implementing authority transferred to the State under the federal Atomic Energy Act. EPA's schedule for completing the cleanup of the so-called Residential Site, as well as all the other NPL sites within West Chicago must incorporate this deadline. The commencement of the cleanup program took place in the Summer of 1994. Cleanup of all the areas should therefore be finished by 1998.

Response: The State of Illinois, which is responsible for identifying State applicable or relevant and appropriate requirements (ARARs) for EPA's consideration, has not identified the cited Illinois statute (Illinois Public Act 87-1024 or "the Karpel Bill") to EPA as an ARAR and has indicated that it believes that the Act does not apply to residential properties. On its face, Illinois Public Act 87-1024 applies only to disposal facilities, licensed sites or property that has been used in whole or in part for the milling of source material. Even if the State of Illinois were to suggest that the Act apply to this Site, Superfund regulations provide that, in order to be considered "applicable," a requirement must be "substantive." EPA does not consider the requirements of Illinois Public Act 87-1024 to be substantive, since the requirements do not pertain directly to actions or conditions in the environment, as would health-, risk- or technology-based requirements. The requirements of Illinois Public Act 87-1024 are administrative in nature, i.e., they pertain to consultation and approval by local authorities, impose deadlines and assess storage fees. EPA does not consider administrative requirements to be "applicable". In fact, the Superfund statute specifically exempts on-site Superfund actions from Federal, State and local permits.

Comment: The EE/CA indicates it is presenting an evaluation of an array of remedial alternatives. The remedial elements considered are identified as "no action," source removal, source removal with interim storage, source removal with off-Rare Earths Facility staging area and source removal with recontamination prevention. The only real alternatives included are no action and source

removal; the other items are simply variations on source removal. Yet the discussion addresses the different versions of source removal as if they were real alternatives. The "no action" option is not accurately characterized either. Here no action really means addressing the Sites through the CERCLA remedial process, rather than the removal process, so that remediation would be delayed. The sections of the EE/CA dealing with the evaluations of alternatives should be re-drafted to reflect and clarify this fact.

Response: The EE/CA states that the two main alternatives are "Alternative 1 - No Action" and "Alternative 2 - Source Removal." The EE/CA also states that the other elements considered are variations of the source removal option, and names them accordingly: Alternative 2, Contingent Actions A, B and C. The EE/CA evaluated each of the contingent actions separately to weigh each against the criteria of effectiveness, implementability and cost. The EE/CA also characterizes the "no action" alternative as meaning that action would be postponed until a final remedial decision was made under the remedial process (as opposed to the removal process) (see, for example, EE/CA pages 4-14, 5-1, 5-10).

Comment: Table 1-1 on page 1-3 of the EE/CA implies that Kress Creek runs from the Rare Earths Facility. This is not accurate. Kress Creek does not flow from the Rare Earths Facility, but a point south of the Facility boundary. The table should be corrected.

Response: Table 1-1 is not meant to imply that Kress Creek runs from the Rare Earths Facility. It does mean, however, that the Kress Creek NPL Site has been defined as running from the Rare Earths Facility. The storm sewer that EPA believes carried contamination from the Rare Earths Facility to the creek is being investigated as part of the Kress Creek NPL Site RI/FS, and is included within the Kress Creek NPL Site boundary.

Comment: Table 1-1 on page 1-3 of the EE/CA states that the source of contamination to the creek is the storm sewer effluent from the Rare Earths Facility. Again, that may not be accurate. Kerr-McGee and EPA have both sampled the effluent from the storm sewer and Kerr-McGee has reported that the effluent is not contaminated with radiologic materials. In addition, the Frame report stated that there are ores visible in the creek bed. Assuming that is the case, the storm sewer should not be cited as the only possible source of contaminants to the creek.

Response: Even if data shows that current storm sewer effluent may not be contaminated with radiologic materials, EPA still believes that the storm sewer was the route by which contamination was transported from the Rare Earths Facility to the creek. This is consistent with statements in the Frame reports

(1981 and 1984), which reported that the contamination in the creek got there via a "storm sewer and drainage ditch." The purposes of sampling the contents of the storm sewer are to determine (1) whether contaminated sediments are still present in the storm sewer that may find their way to the creek, and (2) whether the Rare Earths Facility is a continuing source of contamination to the creek. The Frame report (1981) stated, "Accumulation of greyish-colored thorium-containing residues are visible in the sediments in slower moving sections of the Creek, particularly near the storm sewer outfall."

Comment: Page 1-4 of the EE/CA includes an extremely broad description of the Residential Site. As the City and EPA have discussed in the past, a definition of the Residential Site which purportedly includes any and all areas in and around the City that are potentially impacted does not comport with the NPL listing document or the Agency's more recent descriptions of the Site. According to the NPL Hazardous Ranking System document for this Site, 88 homes to the west of the Factory Facility make up the Site. Further, in our more recent discussions, the Residential Site has been defined by aerial survey boundaries generated based on an IDNS fly over of the area. That definition of the Residential Site is depicted at page 1-6 of the EE/CA. The City has made the EPA aware of the problems which stem from an overly broad view of the Residential Site. Residents and other property owners become understandably upset when they learn that their homes and properties may be in a Superfund Site even though no contamination has been identified at a given location. The EE/CA should be internally consistent and consistent with the Agency's current view of what constitutes the Residential Site.

Response: EPA has defined the Residential Areas Site study area as is depicted in the figure on page 1-6 of the EE/CA. The broad description on page 1-4 is under the heading "Location of Study Area," and the EE/CA clarifies on page 1-5 that the Site study area currently is defined as shown in the figure on page 1-6. The Residential Areas Site boundaries will not be identified until the completion of the Remedial Investigation.

Comment: Page 2-1 of the EE/CA describes the Rare Earths Facility as a thorium processing site. While it is true that thorium was processed, other materials were also produced at the site. It is important to note the production of these other products, since each process generated a waste stream with different radiologic and chemical make-up. These statements should be corrected to accurately reflect Facility operations as described by Kerr-McGee.

Response: This comment is noted. The description on page 2-1 of the EE/CA was not intended to be a complete description of the Rare Earths Facility operations, but rather just an overview.

Comment: On page 2-15 of the EE/CA, EPA discusses the finding of metals at the Rare Earths Facility, Reed-Keppler Park and the Sewage Treatment Plant. However, metals have not been detected at the Residential Sites or in Kress Creek. This fact should be mentioned so that the public is in an informed position to evaluate the likelihood of metals being present and any attendant risk. On page 3-1 of the EE/CA, EPA mentions that it will be testing for metals as part of the pilot study. That fact should be noted at page 2-15. In addition, the results of all the pilot study testing should be available to help define the appropriate scope of the removal actions before actual removals are undertaken.

Response: These facts already are mentioned on page 2-15. Page 2-15 of the EE/CA states, "Soils at the Residential Areas site and Kress Creek site have been analyzed in the laboratory for metals. However, the analytical results had not been evaluated prior to the publication and release of the EE/CA; thus the suspected metal contamination has not been confirmed. The metals data for the Residential Areas site soils will be evaluated as part of the ongoing pilot study...The metals data for the Kress Creek site...will be evaluated when the radiological analyses have been completed." The results of the pilot study will be available prior to the beginning of actual excavation work.

Comment: In discussing the alternative of interim storage of materials on page 4-10 of the EE/CA, no mention is made of the fact that the City did offer the use of some of its property as an alternative temporary storage location. If City property were used, purchase would not be required. The City believes that EPA should factor this option into its evaluation of temporary storage alternatives.

Response: Purchasing a property was mentioned as one possibility under the general response action of interim storage, but is not seriously considered as a valid option. Although the City did offer the use of some of its property, it is a moot point at this time, as the only interim storage option that would be used now is the Rare Earths Facility.

Comment: In the section of the EE/CA beginning on page 4-12, EPA is dealing with the possible means to prevent recontamination of Kress Creek properties should the creek flood. The City has a suggestion for a relatively low cost method that would prevent recontamination, and that does not have as many drawbacks as sheet piling. A geofabric filter approximately two feet high could be used along the creek. That fabric would allow water through, while sloughing sediments back into the Kress Creek bed. The City suggests that EPA evaluate the use of this fabric as an alternative to sheet piling.

The City also suggests that EPA evaluate vacuuming the creek as a quick, effective means of removing the source of contamination to the Residential

Sites. If the creek bed were vacuumed, the EPA could then monitor it as the RI/FS proceeded to see if additional remedial work were needed over time. After vacuuming, flooding of the Residential Sites in an interim period might not be as great a concern.

Response: EPA is taking a closer look at the option of using a geofabric filter, also known as a "silt fence," as a possible means of recontamination prevention for Kress Creek residential properties. If EPA decides that such an option should be implemented, the Action Memo would be amended if necessary. An initial look at this option, however, indicates that it could only handle floodwaters of 1 to 2 feet in height. The EE/CA evaluated the possibility of a 100-year flood event, where the flood waters would rise from 5 to 7 feet in height in the areas of concern. Flood waters higher than 1 to 2 feet in height would not be effectively handled by the silt fence, and might wash it down. The effect of heavy snow and chunks of ice during spring melt must also be considered.

Regarding the suggestion of vacuuming creek, such an option is beyond the scope of this EE/CA and Action Memo. Actions to address the majority of the contamination at the Kress Creek Site (including the contaminated sediments in the creek bed) will be evaluated as part of the RI/FS for the Kress Creek Site.

Comment: On page 4-19 of the EE/CA, under the first bullet point, it must be noted that the City of West Chicago has independent approval authority for the movement of materials to and from the Rare Earths Facility. Under the second bullet point, the State of Illinois and the City of West Chicago have already entered into a court-enforceable agreement specifying that the storage of offsite material at the Rare Earths Facility will not continue more than six months. That six month period should replace the one year period currently noted in the EE/CA.

Response: The bullet points on page 4-19 of the EE/CA describe assumptions that were made with respect to the option of interim storage at the Rare Earths Facility. Failure to make a statement about City authority in the EE/CA does not significantly affect that option or in any way affect any authority the City has. The one-year interim storage period noted in the EE/CA was included solely for the purposes of estimating costs and is not legally enforceable in any way.

Comment: In Section 4.3.6 of the EE/CA (page 4-20), EPA should add a statement that the City of West Chicago and/or DuPage County have independent approval authority over the activities described in this section (off-Rare-Earths-Facility staging area). The local governmental entity having such authority depends

upon the actual location of the activities. On page 5-11 of the EE/CA, EPA states that no additional permits or administrative requirements have been identified for the off-Rare Earths Facility staging contingency. Depending upon where the off-facility staging area is to be located, the City of West Chicago and/or DuPage County approvals would be necessary prior to the establishment of a staging area. The analysis of this alternative must take those independent local authorities into consideration.

Response: At this time, EPA does not believe that any permits or authorizations would be needed for Contingent Action C -- Off-Rare-Earths-Facility Staging Area. Such a staging area would NOT be a storage area, but rather would be an existing railyard where EPA could take properly packaged wastes for loading onto trains. EPA is not considering constructing a new waste storage area, nor is EPA considering constructing a new railspur. Wastes would not be handled in bulk, but would be properly packaged to meet all applicable Department of Transportation requirements. If the wastes are properly packaged, IDNS has informed EPA that no State approvals would be required in order to load the packages onto trains. EPA is not aware of any local approvals that would be required.

Comment: Page 5-6 of the EE/CA should be clarified to more accurately describe the source of contaminants to the residential soils along Kress Creek. As EPA has stated in other portions of the EE/CA, it is the surface water, i.e., Kress Creek flooding, which has apparently contaminated these residential soils. That relationship should be more clearly considered so that it does not appear as if the residential soils are the sole source of the contamination for that portion of the Kress Creek Site.

Response: This comment is not relevant to page 5-6 of the EE/CA, which discusses whether any of the removal alternatives would impact the quality of groundwater or surface water.

Comment: Page 5-7 of the EE/CA should be clarified to state that ARARs will not be met during the period of remedial delay. However, once a remedial decision is made and action undertaken, the ARARs would have to be met.

Response: The statement on page 5-7 should be interpreted to mean that ARARs will not be met under Alternative 1, which is no removal action. To the extent required by Superfund law, ARARs would be met for a final remedial action.

Comment: The comparison of alternatives on pages 5-20 and 5-21 of the EE/CA approaches the "no action" option as if no remediation would ever take place. However, according to EPA's initial description of the alternative, "no action"

really means delayed action. Therefore, this evaluation of alternatives should be modified to compare removals with action delayed for some period of years.

Response: As described in response to previous comments, the "no action" alternative in the EE/CA was identified to mean that action would be postponed until a final remedial decision was made, and was evaluated as such.

Comment: Page 5-21 of the EE/CA should indicate (under the category of "Implementability") that City of West Chicago and/or DuPage County approvals are required for all of the Alternative 2 variations.

Response: Failure to make a statement about City and/or County authority in the EE/CA does not in any way affect any authority the City and/or County has. EPA is not currently aware of any local approvals that would be required for Contingent Action B.

IV. SUMMARY OF COMMENTS FROM KERR-McGEE CHEMICAL CORPORATION

Comment: Page ES-1 of the EE/CA asserts that elevated indoor concentrations of thoron and radon and their daughters may be exhibited in some houses as a result of the presence of tailings. This is true only if a home were built on a substantial volume of tailings or if tailings were used, for example, as backfill around a substantial portion of a foundation. Kerr-McGee has had extensive experience with the off-site contamination in the West Chicago area as a result of the cleanup effort in the mid-1980s. Kerr-McGee rarely encountered properties where a home was built on a substantial volume of tailings or where tailings were used as backfill around a substantial portion of a foundation, and any such properties within the City have already been addressed. Any contamination that may remain at the residential areas within the City is expected to be found in small, isolated pockets that would be highly unlikely to have any consequences on indoor radon or thoron levels. It thus is extremely unlikely that indoor thoron levels will be found to be significantly different from that which would be expected for ordinary homes in uncontaminated areas.

Response: While Kerr-McGee "rarely" encountered properties where a home was built on a substantial volume of tailings or where tailings were used as backfill around a substantial portion of a foundation, such situations were encountered. Kerr-McGee found at least one property where the indoor thoron levels were significantly elevated as a result of tailings beneath the house.

While EPA agrees that the likelihood of finding such situations within the City are low (because of Kerr-McGee's previous cleanup effort within the City), the same cannot be said about properties outside of the City. It is quite possible that some homes outside the City were built on a substantial volume of tailings. Therefore, elevated indoor concentrations of thoron and radon and their daughters may be exhibited in some houses.

Comment: Region 5 continues to rely on its Focused Risk Assessment for West Chicago Vicinity Properties (Jan.1993) to justify its proposed removal program (EE/CA pages ES-2, 2-26 to 2-29, 5-2). The Focused Risk Assessment drew exaggerated conclusions with respect to risk from data collected from a few highly contaminated residential sites, and was subjected to strong criticisms by the State, the City of West Chicago, and other governmental representatives. In response to these criticisms, Region 5 has acknowledged that the Focused Risk Assessment and its findings are "preliminary" and that further data collection and discussion of assumptions would be appropriate. Yet, despite this fact, the preliminary Focused Risk Assessment remains Region 5's only analysis of the potential risks posed by thorium tailings at the residential areas.

In addition, in many places throughout the EE/CA the Agency improperly has used the data from the preliminary assessment to support decisions concerning the conduct of the removals at the residential areas site. For example, the EE/CA provides an estimate of the short-term risks to workers during implementation of the source removal alternative (Alternative 2) (EE/CA pages 5-2 to 5-4) based on the assumption that the volume-weighted average concentration for thorium-232 is 35 pCi/g. But that value has been derived from single samples taken from a few highly contaminated properties and does not reflect the circumstances at the residential areas site, and thus cannot be used to estimate the risks to workers from exposure to soils with significantly lower Th-232 concentrations.

Response: EPA guidance on conducting non-time-critical removal actions describes a "streamlined risk evaluation" which is intermediate in scope between the limited risk evaluation undertaken for emergency removal actions and the conventional baseline risk assessment normally conducted for remedial actions. The streamlined risk evaluation can help justify taking a removal action and identify what current or potential exposures should be prevented. The results of the streamlined risk evaluation help EPA decide whether to take a cleanup action at the site and what exposures need to be addressed by the action. For the EE/CA, the streamlined risk evaluation should focus on the particular problem the removal action is intended to address (e.g., soil contamination). According to the guidance, a risk evaluation that identifies only contaminants of concern in the affected media, contaminant concentrations, and the toxicity associated with the chemical can be sufficient

to justify taking a removal action. A full baseline risk assessment is neither required nor recommended.

The Preliminary Focused Risk Assessment conducted by EPA and discussed in the EE/CA fulfilled the objectives of the streamlined risk evaluation and is consistent with EPA guidance. It identified, based on limited IDNS data that was available at the time, contaminant concentrations at some Site properties, and identified current or potential exposures that are of concern at the Site. The streamlined risk evaluation discussion in the EE/CA added additional information on the toxicity/health effects of the contaminants of concern. The streamlined risk evaluation is not EPA's sole justification for taking a removal action at the Site, but does help justify taking an action. The Action Memo discusses additional factors upon which EPA relied for its decision.

As explained on page 5-3 of the EE/CA, EPA based worker exposure risk estimates on conservative assumptions, including data in the Preliminary Focused Risk Assessment. This was done to maximize worker protection, consistent with the ALARA principle.

Comment: In various places throughout the EE/CA, the screening and cleanup standards that EPA has decided should be applied to the residential areas site are referred to as "applicable or relevant and appropriate requirements (ARARs)" (EE/CA pages ES-2, 3-2 to 3-5, Appendix B). By definition, the term ARAR is limited to specific state or federal regulatory requirements that are legally "applicable" or that are "relevant and appropriate" under the circumstances. As demonstrated in Kerr-McGee's earlier comments (Mar. 93) on the Action Criteria, the cleanup standards cannot properly be considered ARARs. In nearly every instance Region 5 has failed to understand the purpose of the regulations it has deemed to be ARARs and the circumstances in which they were intended to apply. Moreover, even for those regulations that could properly be viewed as ARARs, Region 5 has significantly and unjustifiably modified their requirements in establishing its criteria. The modifications are sufficiently significant that the criteria cannot be said to derive from the regulations.

Response: This comment has been addressed previously (see "Summary of Responses to Public Comments on March 1993 Review Draft of Action Criteria" [December 1993], which is included in the administrative record for this action). The Action Criteria Document discusses in detail EPA's determination of which federal or state regulatory requirements, or portions of federal or state regulatory requirements, are considered "relevant and appropriate." (None of the federal or state requirements are "applicable" to the Site.) The cleanup standards for this removal action were derived from ARARs to the extent practicable.

Comment: Region 5 should recast the statements in the EE/CA concerning the origin of the thorium materials in Kress Creek and associated areas (EE/CA pages ES-1, 1-4). It has never been demonstrated that Kress Creek and the properties along the creek have been contaminated by runoff from the West Chicago Rare Earths Facility. A storm sewer passes immediately adjacent both to the portion of the Facility at which processing occurred and to the Facility waste disposal area. The storm sewer discharges into Kress Creek at the point where elevated levels of thorium are first observed. This has led to speculation that materials from the Facility escaped into the storm sewer and that these materials are the source of the thorium contamination in the creek. But, no theory has ever been advanced that adequately explains the quantity of thorium-bearing materials in the creek, which far exceeds that which seemingly could be accounted for by discharge from the Facility's storm sewer. As a result, there remains substantial uncertainty as to the origins of the thorium materials in Kress Creek and associated areas.

Response: How thorium materials were deposited in Kress Creek is irrelevant to the threat presented by the materials and the actions necessary to address that threat. Whether or not the quantity of thorium-bearing materials in the creek has been adequately explained to date, EPA believes without reservation that the materials originated at the Rare Earths Facility and share the characteristics of materials at the facility. NRC records indicate that the most likely vehicle by which the contaminants were transported from the Rare Earths Facility to the creek is the storm sewer. The contamination entering the storm sewer may have been surface runoff from the Rare Earths Facility, or may even have been direct process waste discharges from the facility in the early years of operation, prior to any regulation of the facility, but there is no doubt that the materials came from the Rare Earths Facility.

Comment: Page 1-1 of the EE/CA correctly notes that the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, limits EPA's authority to take only those removal actions that are "appropriate" to address the threat of a release of hazardous substances. But, as explained in Kerr-McGee's previous comments (Mar.93) on the Action Criteria, the cleanup program of the residential areas within the City in the mid-1980s has already served to cleanup most properties in the West Chicago area to levels that pose no significant residual risks. As a result, the extensive removal program contemplated by EPA cannot be considered "appropriate" or otherwise justified by the need for prompt action to address threats to public health.

Response: While Kerr-McGee's previous cleanup effort addressed many contaminated properties within the City limits, many other properties (located both outside the City and within the City) remain contaminated. The Action

Memo establishes and documents the appropriateness of the selected removal action for this Site.

Comment: Page 1-4 of the EE/CA indicates that Region 5 intends to expand the scope of its removal program to address residential properties along the waterline in the floodplain (but not the channel sediments) of Kress Creek. None of EPA's previous documents indicated that such properties would be included in the EE/CA. Region 5 has not fully characterized the contamination in the area, has not conducted a risk assessment, and has not demonstrated that the cleanup criteria that were tailored for the residential area properties are appropriate for the Kress Creek properties. We question whether Region 5 has established a proper procedural predicate for inclusion of the Kress Creek properties under the current removal program. Despite its misgivings, Kerr-McGee does not object to a limited and focused program that seeks to cleanup the small localized areas of contamination that may be present at properties within the floodplain of Kress Creek. However, there is no justification for an extensive removal program in the Kress Creek floodplain area. [The comment went on to give detailed information on the findings of previous gamma surveys by NRC and Kerr-McGee.] To the extent Region 5 contemplates a removal program beyond that needed to address the few area "hotspots" that have been identified, we suggest that the Agency defer action until the RI/FS that is planned for the Kress Creek area is completed. Any plans to conduct excavations below the water table, for example, would require careful analysis and a full consideration of alternatives that can only be accomplished in the context of an RI/FS of the site.

Response: The removal action has been expanded, as described in the EE/CA, to include only those contaminated floodplain soils that are actual residential properties. The contamination at the residences along the creek is no different from the contamination at other residential properties except perhaps for the method by which the contamination came to be located there, so the risks at those residential properties would be similar to the risks at other residential properties. The cleanup criteria that were developed specifically for the Residential Areas Site are indeed appropriate for the Kress Creek floodplain soils that are residential properties, specifically because they are actual residential properties. An extensive removal action at the Kress Creek Site (e.g., excavations of creek sediments, extensive excavations of non-residential floodplain soils) is beyond the scope of the EE/CA and this action.

Comment: Region 5 proposes to undertake the cleanup of the West Chicago residential sites under the guise of a "non-time-critical removal action" (EE/CA pages 1-5 to 1-7). Removal actions are intended to be limited to short-term, relatively inexpensive activities. (Fund-financed removal actions are limited to \$2 million or 12 months in duration). Yet, the costs of the residential cleanup

(estimated at between \$22 million to \$119 million, depending on the volume of material to be excavated), far exceed the costs incurred in any other removal program of which we are aware. Kerr-McGee previously has provided extensive comment on whether the proposed removal is consistent with EPA authority under the National Contingency Plan (NCP). (See Kerr-McGee comments on the Action Criteria.) The EE/CA provides no recognition of, or response to, the issues Kerr-McGee has raised on these matters. We justifiably expect that Region 5 will address these issues in the responsiveness document that is to be prepared in connection with the EE/CA.

Response: While fund-lead removal actions generally are limited to \$2 million or 12 months in duration (these limits can be exceeded under certain circumstances), no such limitation exists for removal actions, such as this, conducted by PRPs. Non-time-critical removal actions and other early actions at sites are being encouraged and are consistent with the new Superfund Accelerated Cleanup Model (SACM). The Action Memo and supporting documentation in the administrative record addresses the issues raised by Kerr-McGee and establishes and documents that the selected removal action is consistent with EPA authority under the NCP.

Comment: The EE/CA reports that after the removal program has been completed, EPA intends to conduct a final RI/FS to determine whether further remediation of the off-site areas is warranted (EE/CA pages 1-7 and 3-1). The cleanup criteria that EPA has selected for the removal program already are significantly more stringent than the standards that have guided every other cleanup of similar sites of which we are aware (see Kerr-McGee comments on the Action Criteria). There thus can be no real prospect that any residual risks that may remain at the conclusion of the cleanups would warrant further action. Moreover, Kerr-McGee strenuously objects to any implication that the residential properties might be subject to further cleanups. Most of the contaminated properties were already subject to extensive remediation in the mid-1980s and the EPA removal program would be the second such cleanup program conducted in the area. There can be no conceivable justification for subjecting the residential areas to a third-round of cleanups, particularly if EPA plans to pass the costs on to others.

Response: It is EPA's intent that this removal action be the final action necessary at the Site, and that the RI/FS will lead to a decision that no further action is necessary. The cleanup criteria were based on ARARs, even though removal actions are not always required to comply with ARARs, to increase the likelihood that no further action would be necessary at the conclusion of the removal action. The application of ALARA will increase this likelihood even more. The effectiveness of implementation of the removal program, the conditions at the post-removal site (as determined by the verification phase

sampling) and the existing federal and state regulations at the time the final remedial action decision is made all have a bearing on whether additional action at the Site will be needed. Other sites that have similar cleanup criteria include the Ottawa Radiation Areas Site, Ottawa, Illinois, and the Maywood Chemical Company Site (residential portions), Maywood, New Jersey.

Comment: The EE/CA (page 1-8) explains that removal actions will be undertaken only where evidence of contamination related to thorium tailings exceeding the discovery criteria is found, and that elevated radiological readings that are attributable to conditions or other radioactive materials not related to the Rare Earths Facility are not subject to removal action. But, nowhere in the document does Region 5 explain how it will assure that only sites contaminated by tailings are remediated. The procedures to guide this important determination should be carefully thought through and presented for comment.

With respect to indoor radon levels, the EPA screening program may well result in a large number of false positives -- determinations that the radon limit is exceeded, but for which no response under CERCLA is appropriate. Data from IDNS show that 25-50 percent of the homes in DuPage County have levels of radon that exceed EPA action levels for reasons entirely unrelated to the presence of tailings. Once levels that exceed the screening level are found, Region 5 will have to undertake detailed further sampling to determine the cause of the readings. This may cause substantial anxiety to affected residents, many of whom have exaggerated fears of the hazards of the tailings, and who likely will be suspicious of any ultimate determination that tailings are not the cause of the elevated readings.

The ability to measure and distinguish between radon and thoron decay products becomes critical to a determination of the cause of elevated indoor radon/thoron measurements (tailings or natural materials). Region 5 has selected the R.A.D. M-1 Surveymeter radon progeny integrated sampling unit (RPISU) for use in the discovery phase of the removal program. But the Agency has not shared with the public the data which demonstrates that the RPISU is an appropriate methodology for accurately measuring and distinguishing between radon and thoron decay products. In addition, because only short term sampling (7-10 days) is contemplated, there is likely to be substantial unreliability in any such measurements.

Response: EPA's investigatory methods for the identification and characterization of contaminated properties are described in the Work Plan for the EE/CA and RI/FS (which is included in the administrative record for this action); it is not necessary for the EE/CA to repeat this information.

With respect to indoor radon levels, EPA acknowledges that false positives may be obtained. However, through an evaluation of the relative concentrations of radon and thoron, as well as an evaluation of the results of other testing (e.g., soil sampling, gamma surveys), EPA would determine whether the elevated indoor levels are caused by mill tailings or naturally-occurring conditions. Kerr-McGee is correct in stating that the ability to measure and distinguish between radon and thoron is critical to a determination of the cause of the elevated readings. As described in the Work Plan, EPA determined during the scoping of the site investigation work that the RPISU was the most appropriate device for measuring radon and thoron decay products at this Site. Upon request, EPA will share with interested parties the information upon which the decision to use RPISU's was based. Lastly, EPA acknowledged in the Action Criteria Document that the shorter-term measurements may not fully characterize the longer-term radon/thoron average concentrations, but determined that short-term measurements may still be useful as a "finding tool" during the discovery phase.

Comment: Page 2-1 of the EE/CA, which includes a history of the ownership of the Rare Earths Facility, fails to reflect the ownership of the Facility by the American Potash and Chemical Company during the period 1958 to 1967.

Response: The first paragraph under Section 2.1 on page 2-1 of the EE/CA reflects the ownership of the Facility by the American Potash and Chemical Company.

Comment: Page 2-9 of the EE/CA asserts that extensive deposits of contaminated materials may be present at the residential properties within the City. But, for the reasons discussed in Kerr-McGee's comments on the Action Criteria, extensive deposits of contaminated material are highly unlikely to be present at these properties. Some 2,726 properties in the City of West Chicago were surveyed in the mid-1980s and 116 of the 117 properties that exceeded the cleanup criteria (30 μ R/hr) were remediated to approximate background levels. There thus is no reason to believe that any City properties with extensive contamination were not addressed during the earlier cleanup.

Response: Page 2-9 does not specifically identify the locations (i.e., within the City or outside the City) of the contaminated materials that may be present, nor does it discuss "extensive" deposits. As discussed in response to previous comments, EPA agrees that the likelihood of finding extensive deposits of contaminated materials within the City at levels which exceed the criteria used in the mid-1980s cleanups is low (because of Kerr-McGee's previous cleanup effort within the City), but the same cannot be said about properties outside of the City or about contamination within or outside the City at levels which exceed EPA's criteria. It is quite possible that some properties

outside the City have extensive deposits of tailings at levels which exceed even the cleanup levels of the 1980s. In addition, it is likely that properties exist within the City that have levels of contamination above the cleanup criteria that have been established for this Site.

Comment: Page 2-6 of the EE/CA estimates that background gamma levels for the West Chicago area range between 5 $\mu\text{R/hr}$ and 13 $\mu\text{R/hr}$. In point of fact, the variability in natural background in the area is significantly higher. An Argonne National Laboratories study (the Frigerio Report, 1978) of the residential areas reports that background varies from 12 to 36 $\mu\text{R/hr}$, and attributes the high natural background to the fact that the soil in the area is higher in uranium, thorium and their daughters than many other soils in Illinois as a result of phosphate fertilization and the use of water with high natural radioactivity.

Response: Page 2-6 of the EE/CA provides general information and does not set the background levels that will be used during EPA's field investigation work. The reported background range took into account not only the 1978 Frigerio Report, but more recent information as well, particularly information recently collected by the IDNS. However, EPA is collecting more information on Site background conditions as part of its Site investigation work and will set background levels for use in implementation of the action criteria before excavation activities begin.

Comment: Page 3-4 of the EE/CA incorrectly estimates the background indoor thoron and radon decay product concentrations for the residential areas at 0.002 working levels (WL). Several studies have shown that radon concentrations in the West Chicago area are elevated for reasons unrelated to tailings and that as many as 50 percent of the homes in the area are likely to have decay product concentrations that are 10 times higher than the 0.002 WL estimate provided in the EE/CA.

Response: As stated on page 3-4 of the EE/CA, the estimated background level was based on data available at the time. The use of this data did not significantly affect EPA's evaluation of cleanup alternatives or selection of the removal action. The same page also states that additional background data will be obtained during EPA's Site investigation work.

Comment: The EE/CA has not provided an estimate of background indoor gamma levels (see page 3-4 of the EE/CA). We assume that the background level will be determined prior to the commencement of the discovery phase of the project and that the data supporting the estimate will be made available to the public. Any effort to determine background indoor gamma levels must recognize that

indoor gamma levels might be artificially raised by the use of construction materials that contain naturally occurring radiological material.

Response: Since indoor gamma exposure rates are being used during the site investigation work and verification phase as a "finding tool" only, it was not necessary to establish the background level for indoor gamma exposure rates prior to initiation of Site investigation work. EPA is collecting some background information on indoor gamma exposure rates as the Site investigation work progresses and will have that information before verification activities begin. EPA recognizes that construction materials that contain naturally-occurring radiological materials may influence indoor gamma levels, and will provide for this phenomenon during implementation of the verification activities.

Comment: Region 5 has not considered all of the data available on Kress Creek and has failed to carefully scrutinize the limited data on which the EE/CA has relied (EE/CA, pages 2-10 to 2-11). The EE/CA relies extensively on sampling conducted for the NRC by Oak Ridge Associated Universities (ORAU) as the source of information concerning the concentrations of thorium-containing materials in and along the creek. An NRC panel of administrative law judges has carefully reviewed the ORAU data and has concluded that there is considerable uncertainty surrounding the sampling results. The EE/CA also relies on the ORAU report for data on gamma exposure rates in the area (EE/CA, page 2-11). But, there are significant problems with that data as well. Finally, the EE/CA has ignored a comprehensive gamma survey of the properties in the vicinity of the creek that was undertaken by Kerr-McGee which revealed that regions with elevated exposure rates are small in areal extent and are infrequently encountered.

Response: Because the EE/CA addresses only a very small portion of the Kress Creek NPL Site and actual cleanups will be based on data collected during the discovery and characterization phase, it was not necessary to scrutinize in detail all of the data available on the Kress Creek Site. The section of the EE/CA on page 2-10 to 2-11 is merely giving a description of past investigations and response. It did, however, fail to mention the surveys of properties in the Kress Creek area previously conducted by Kerr-McGee, although EPA is aware of these surveys and their results. The issues regarding the alleged "problems" with the past data are not really relevant to the selection of the response action, as decisions regarding which properties will be remediated will be based on data that EPA currently is collecting (and not on past data). Section 2.3.2 of the EE/CA is not intended to identify specific properties for cleanup but to support inclusion of portions of the Kress Creek Site in the study area.

Comment: Region 5 plans to investigate the degree of equilibrium between Uranium-238 and its decay products in residential area soils by analyzing soil samples that are to be collected from Kress Creek, Reed-Keppler Park, and the Sewage Treatment Plant (EE/CA, page 2-12). However, no explanation is provided as to why samples will not be taken from the residential areas themselves. It would seem that analysis of soils from the residential areas would provide the most direct correlation between U-238 and daughter equilibrium concentrations in residential area soils.

Response: As discussed in response to previous comments, EPA has decided to collect samples from the Residential Areas Site and analyze them for Th-232, U-238, Ra-228 and Ra-226 to investigate the degree of their equilibrium. EPA will expedite the analysis of these samples and will share this information with interested parties as soon as validated data becomes available.

Comment: The EE/CA incorrectly reports that the Rare Earths Facility may have significant sources of metal contamination other than those generated from ore processing (EE/CA, page 2-15). The metals that are present in the tailings pile are at the levels that are typical of the natural ore from which the tailings were produced. There thus is no reason to believe that the presence of metals in the Facility wastes are derived from sources other than the natural ore that was feed to the process.

Response: This comment may be correct and is duly noted, although whether metals contamination derives from "natural ore" byproducts or from other Rare Earths Facility sources does not affect the removal action.

Comment: With regard to the issue of possible metals contamination, and the fact that metals have been found at the Reed-Keppler Park Quarry NPL Site, the EE/CA correctly reports that Reed-Keppler Park was used as a landfill with multiple waste generators (EE/CA, page 2-15). Indeed, much of the waste disposal that may have occurred at Reed-Keppler Park has not been attributed to the Rare Earths Facility. Nonradiological contaminants identified in soil samples collected from within the fenced security area include semivolatile organic compounds and pesticides, compounds not identified in Facility soils or groundwater.

Response: This comment is noted and does not affect selection of the removal action.

Comment: Region 5 has not adequately explained why barium and chromium are considered potential contaminants of concern even though the data show that neither metal will exceed its respective risk-based concentration (EE/CA, page 2-16). The decision to include barium and chromium as potential contaminants

of concern appears to be based on EPA's incorrect decision to include barium and chromium in the hazard ranking score (HRS) for the off-site areas (EE/CA, page 2-21). But, the HRS is intended to provide a ranking of hazardous waste sites for the purpose of determining whether to include the sites on the NPL, and is not intended to guide the conduct of removal actions.

Response: As stated on page 2-16 of the EE/CA, barium and chromium are considered potential contaminants of concern because they were included in the HRS scoring package for both the Residential Areas and Kress Creek NPL Sites. EPA currently is investigating, as part of its Site investigation work, whether these metals should continue to be considered contaminants of concern. The results of this investigation, and not the HRS scoring information, will guide the conduct of the actual removal actions.

Comment: The EE/CA correctly notes that because of its extremely short half-life (55 sec.), the potential for migration of thoron into a home is low, and it goes on to note that once thoron enters a home through foundation cracks or sumps, its decay product, lead-212, may persist in the home for some time and may migrate from the entry point (EE/CA, page 2-20). The EE/CA has failed to note, however, that because of the relatively small diffusion rate for thoron, only the very near surface of contaminated soil can release thoron into the crawl space or basement of the home, so only an extremely small fraction of the thoron emitting from the tailings will enter the residence in the first instance. Moreover, much of the lead-212 that would be generated is likely to be removed from the air by mechanisms such as plate-out and thus becomes unavailable for exposure to the resident.

Response: EPA agrees that probably only the very near surface of contaminated soil can release thoron into the home because of the relatively small diffusion rate for thoron. Mechanisms such as plate-out are factors to be considered for thoron decay products, just as they are with radon decay products. However, EPA still believes that radon/thoron monitoring could serve as a useful "finding tool" to find material beneath or against the foundation of homes.

Comment: Region 5 has declined to endorse soil separation of excavated soils from the off-site areas as a treatment option (EE/CA, page 4-10). Although Kerr-McGee does not expect that soils from shallower excavations of off-site properties will be suitable for screening, soils from deeper excavations may contain sufficiently clean materials so as to justify soil separation. Soil separation may offer significant reductions in the volumes of the soils that would need to be transported off-site for disposal and should be retained as a treatment option. Indeed, Kerr-McGee's analysis of the feasibility of soil separation indicates that the separation of coarse soil fractions with

concentrations below 5 pCi/g total radium from more highly contaminated material is technologically feasible and economically attractive. Volume reduction achieved by soil separation provides substantial societal benefits as well -- space in waste depositories is increasingly scarce; no health or safety benefit is achieved by requiring material that can be separated from contaminants by soil separation to be disposed of in permanent depositories; and volume reduction reduces non-radiological risks resulting from transportation of large volumes of material to a distant repository. Volume reduction also lowers the expense of transportation and disposal. U.S. EPA itself has, in technical publications, endorsed the use of volume-reduction as an innovative technology for the cleanup of Superfund sites containing radiological material. Finally, it should be recognized that after the off-site materials are brought to the Rare Earths Facility, the materials will be governed by the IDNS, who will oversee and control all actions taken with respect to the manner in which the materials are processed, stored, and managed at the Facility.

Response: The decision was made in the EE/CA not to retain volume reduction techniques such as soil separation for further consideration on the Residential Areas Site because the information available to EPA indicated that the process is not presently sufficient to reduce the contaminant concentration to levels below the 5 pCi/g total radium criterion for a significant fraction of the waste from this Site and to be consistent with the ALARA principle. Because EPA did not believe that the technology was appropriate for use at the Residential Areas Site, EPA did not deem it necessary to endorse use of the technology for Residential Areas Site materials taken to the Rare Earths Facility. EPA is not aware of any facility in the country that is a licensed treatment facility for 11(e)(2) byproduct material within the meaning of EPA's Off-Site Rule. Accordingly, the Action Memo requires that all contaminated materials removed from affected properties be transported to a permanent off-site disposal facility. EPA does not believe that the Rare Earths Facility is currently licensed to accept 11(e)(2) byproduct material from outside the facility for treatment or disposal. EPA would need to review any treatment licenses and actual data from the physical separation facility demonstrating its ability to meet applicable standards before EPA would approve transportation of materials to such a facility for treatment.

Comment: Region 5's preferred removal alternative (Alternative 2 - Source Removal) seems to envision that the off-site materials are to be loaded onto railcars as soon as sufficient materials accumulate at the Facility staging area to fill a railcar (EE/CA, page 4-17). This approach is unreasonable. Off-site materials will need to be stockpiled at the Facility before the materials are shipped off-site for disposal. Kerr-McGee has committed to an aggressive schedule for the removal of the Facility tailings -- with removal of the most

highly contaminated materials first -- and cannot, consistent with its commitments, dedicate railcars to the priority removal of materials from the off-site properties, much of which is expected to consist of soils with contamination at levels slightly above background. Instead, the materials of lesser radioactivity will be transported as railcar space becomes available. Other contingencies such as inclement weather may necessitate that the off-site materials be stockpiled at the Facility before the materials can be shipped to the disposal site.

Although interim storage of off-site soils at the Rare Earths Facility has been retained as an alternative for further consideration, Region 5 has not yet endorsed interim storage for use in the removal program. We urge Region 5 to do so. Region 5 has imposed two conditions on the acceptability of the Facility for interim storage of off-site soils: the storage period must be temporary (up to one year) and the off-site soils must be segregated from the other Facility wastes (EE/CA, page 4-11). Both conditions are readily satisfied. As off-site soils arrive at the Facility, they will be placed in stockpiles, and each stockpile will be removed within six months from the date on which it was established. Kerr-McGee has no objection to segregating soils from the West Chicago Superfund sites from other Facility materials. However, Kerr-McGee does not intend to establish a separate stockpile for each load of off-site materials that is received at the Facility. It also should be understood that the off-site soils will likely be blended with other Facility soils prior to shipment to assure satisfaction of standards for acceptance by Envirocare (e.g., activity, moisture, pH).

Response: The discussion on page 4-17 of the EE/CA is a conceptual-level description of the source removal alternative. Although it stated, "When sufficient quantities of material have been collected at the staging area, the railcars are loaded...", the term "sufficient quantities" was not defined. In addition, this was a conceptual-level description only, and as clearly stated elsewhere in the EE/CA, some of the assumptions made in the EE/CA were for cost estimating purposes only, and were not meant to dictate the exact procedures to be used during the removal action; the Work Plan for the removal action, after approval by EPA, will detail how the work (including use of railcars) will be conducted. EPA acknowledges Kerr-McGee's aggressive schedule for shipping the Rare Earths Facility wastes. If Kerr-McGee wishes to stockpile wastes from the Residential Areas Removal Site at the Rare Earths Facility prior to shipment, those procedures should be included in the Work Plan Kerr-McGee will submit to EPA (if Kerr-McGee conducts the work) and must comply with standards and schedules contained in the IDNS license amendment and other applicable requirements.

EPA disagrees with the comment that EPA has not endorsed the interim storage option. Past EPA factsheets related to the Site endorsed this option, and the EE/CA concludes that "Contingent Action A -- Interim Storage" is allowed. EPA has stated that in order for interim storage to be acceptable, the storage must be temporary and the off-site soils must be segregated from other contaminated soils from the Rare Earths Facility. However, the one-year period for interim storage assumed in the EE/CA was an assumption for cost estimating purposes only. EPA does not expect Kerr-McGee to establish a separate stockpile for each load of material that is received at the Rare Earths Facility, and EPA has no objection to the blending of materials from this Site with other materials at the Rare Earths Facility for purposes of shipment of the materials to Envirocare.

Comment: The EE/CA refers to contaminated soils from the Rare Earths Facility and other "Kerr-McGee sites." Kerr-McGee strenuously objects to the designation of the off-site NPL-listed sites as "Kerr-McGee" sites. Kerr-McGee is not and has never been the owner of these off-site areas. Kerr-McGee is not a "responsible party" under CERCLA Section 107 with respect to these areas. Kerr-McGee became the owner of the Facility in 1967 as a result of a corporate acquisition. Kerr-McGee understands that the tailings were removed from the Facility by various residents, contractors, or others in the 1930s and 1940s -- apparently the Facility was viewed by the community as a source of fill material. The Kerr-McGee connection to the off-site contamination is too attenuated to provide a foundation for liability. The only conceivable theory by which Kerr-McGee might be deemed liable as a responsible party is that it somehow "by contract, agreement or otherwise arranged for disposal...or arranged with a transporter for disposal..." In circumstances in which tailings were placed on the off-site areas by third parties without involvement by Kerr-McGee, Kerr-McGee cannot be deemed to have arranged for disposal.

Response: The NPL Sites are referred to as the Kerr-McGee sites because that is how their name appears on the National Priorities List. The issue of Kerr-McGee's liability is not relevant to the analysis and selection of the removal action, but will be addressed at the appropriate time.

Comment: The discussion in the EE/CA concerning Envirocare's readiness to accept shipments of Section 11(e)(2) byproduct material is outdated (EE/CA, page 4-12). The first railcar of tailings destined for disposal at the Envirocare site left the Rare Earths Facility on September 9, 1994.

Response: This comment is noted and does not affect selection of the removal action. The discussion in the EE/CA was current at the time the EE/CA was prepared.

Comment: Region 5 has retained for further consideration the installation of a barrier wall of sheet piling along the banks of Kress Creek to prevent possible recontamination of Kress Creek properties during severe flooding events (EE/CA, pages 4-5, 4-13). We find this proposal to be extraordinarily impracticable and unnecessary. The EE/CA aptly demonstrates that sheet piling would add significant costs to the cleanup program, would divert time and effort in securing the necessary federal and State approvals, is likely to be extremely unpopular with the local community, and is largely unnecessary given the extremely low probability of a storm/flooding event of significant severity and magnitude to cause deposition of contaminated sediments onto the Kress Creek properties.

Response: Although sheet piling was evaluated in the EE/CA as a possible means of recontamination prevention, the EE/CA concluded that this option was not recommended.

Comment: Region 5 has proposed that excavated soils from residential properties be packaged in polypropylene bags for shipment to the Rare Earths Facility (EE/CA, page 4-17). Any requirement for packaging of excavated soils is unnecessary and impracticable. Bulk shipment of soils was employed during the West Chicago cleanup that was conducted in the mid-1980s with EPA oversight and NRC approval. In all, some 35,000 cubic yards of soil were safely transported to the Facility from the residential areas without a single mishap. The use of packaging for the soils would serve to increase costs, would prevent the maximum utilization of truck and railcar space, and can not be justified on the basis of health or safety. We thus urge Region 5 to drop any further consideration of packaging the soils in polypropylene bags.

Response: The EE/CA states (on page 4-16) that the packaging option was an assumption that was made solely for the purpose of having a consistent basis on which to estimate costs, and that bulk shipment of the materials from this Site is not precluded by this assumption. Packaging of the wastes is not a requirement. The actual procedures for conduct of the work will be governed by the EPA-approved Work Plan for the removal action.

Comment: The Illinois Uranium and Thorium Mill Tailings Control Act referenced on page 4-19 of the EE/CA has recently been amended.

Response: This comment is noted. The amendment does not affect the cost estimates in the EE/CA.

Comment: The EE/CA compares the potential dose to residents from removal activities to the 10 mrem/yr standard for airborne releases found in the National Emission Standard for Hazardous Air Pollutants (NESHAPs) at 40 CFR 61 (EE/CA,

page 5-3). The NESHAP by its terms applies to radionuclide emissions from NRC-licensed facilities only. The comparison to the NESHAP in the context of the residential site cleanup thus is improper; the NESHAP simply does not apply to residential sites.

Response: The EE/CA does not state nor imply that the NESHAP standard for airborne releases applies to the Residential Areas Site. The EE/CA was merely comparing estimated doses to the general public with established dose limits in other regulations to give readers some context for the dose estimates.

Comment: Kerr-McGee supports the use of the Rare Earths Facility as a site at which soils excavated during the removal program could be stored until they are shipped for disposal to Envirocare (EE/CA, pages 5-4 to 5-5). In our view, the only sensible approach is the use of the Rare Earths Facility for storage and shipment.

Response: EPA agrees that the most logical place to take the materials for staging or storage before they are shipped for disposal is currently the Kerr-McGee facility.

Comment: In the discussion of the incremental dose to the nearest resident from interim storage at the Rare Earths Facility reference is made to a regulatory limit of 50 mrem/yr (EE/CA, page 5-4). The reference appears to be in error. The relevant NRC limit is 100 mrem/yr (10 CFR 20.1301, 1993).

Response: This is correct. EPA does not believe that this comment requires revision of the EE/CA at this time because it would not result in a change in the selected removal action. The comment is noted for future reference, particularly if Contingent Action A (Interim Storage at the Rare Earths Facility) requires implementation.

Comment: Region 5 has retained as a contingent action the transportation of excavated soils to a railspur and staging area at some unidentified site other than the Rare Earths Facility (Alternative 2, Contingent Action B) (EE/CA, pages 4-15, 4-19 to 4-20, 5-5). This alternative is unnecessary. Kerr-McGee has received the necessary approvals from the IDNS to permit the interim storage of off-site soils at the Facility. Moreover, a railspur and loading facility has already been constructed at the Facility and shipments are now occurring.

Response: The development of the Off-Rare-Earths- Facility Staging Area contingent action was necessary in case Kerr-McGee, for some reason, does not conduct the removal action work at this Site and the work instead is conducted by EPA. Although Kerr-McGee has obtained approvals from IDNS to accept wastes at the Rare Earths Facility and has indicated a willingness to

conduct the work at this Site, Kerr-McGee is not currently under any legally enforceable requirement to conduct the work.

Comment: The EE/CA asserts that runoff from the Rare Earths Facility may have impacted surface water and storm sewer conveyance facilities (EE/CA, page 5-6). That assertion is misguided. All surface runoff from the Kerr-McGee Facility is contained within the Facility boundaries. There is no basis for believing that Facility runoff has impacted sewer conveyance facilities.

Response: Although all surface runoff from the Kerr-McGee Facility currently may be contained within the Facility boundaries, this was not necessarily the case during the entire history of Facility operations (from 1932 until now). As discussed in response to previous comments, EPA believes that contamination from the Facility was carried to Kress Creek via a storm sewer.

Comment: Inexplicably, the EE/CA has failed to identify the permits and regulatory requirements that must be secured before an off-Rare Earths Facility railspur and staging area can be established (EE/CA, page 5-11). Construction of the railspur and staging area would require, at a minimum, issuance of construction permits from local authorities and presumably would require licenses or approvals from IDNS and other State agencies.

Response: At this time, EPA does not believe that any permits or authorizations would be needed for Contingent Action C -- Off-Rare-Earths-Facility Staging Area. Such a staging area would not be a storage area, but rather would be an existing railyard where EPA could take properly packaged wastes for loading onto trains. EPA is not considering constructing a new waste storage area, nor is EPA considering constructing a new railspur. Wastes would not be handled in bulk, but would be properly packaged to meet all applicable Department of Transportation requirements. If the wastes are properly packaged, IDNS has informed EPA that no State approvals would be required in order to load the packages onto trains.

Comment: EPA Region 5 has added a new element to the cleanup criteria which now provide that, in addition to the specific numerical cleanup criteria, all cleanup activities must comply with the additional requirement that "every reasonable effort should be made to maintain radiation exposures, and the amount of radioactive materials in unrestricted areas, to levels that are as low as reasonably achievable (ALARA)." Kerr-McGee objects to the addition of a significant new element to the cleanup criteria without any opportunity for affected parties to comment. EPA's addition of the ALARA criterion seems to undercut the whole purpose for the establishment of criteria -- the need for concrete and precise guidance for the conduct of sampling and cleanup. The 5 pCi/g standard now has been recast by Region 5 to require that "excavation of

contaminated soils continue until concentrations clearly below the target levels are achieved" (EE/CA, page 6-6). Such an approach is completely impractical, as it may require negotiation of the cleanup level on a residence-by-residence or perhaps shovel-by-shovel basis. In addition, EPA has misunderstood how the ALARA principle is to be applied. If EPA persists in considering an ALARA-based cleanup standard, it should at least apply the ALARA principle in the same fashion as IDNS has done in setting the cleanup standard for soils at the West Chicago Rare Earths Facility (the "Facility"). IDNS has applied ALARA in the context of developing specific soil cleanup standards -- namely to justify cleanup to the 5 pCi/g level -- and not to demand a non-specific and indefinite obligation for further cleanup.

Response: The addition of ALARA as an element of the cleanup criteria for this Site was not made in the EE/CA, but was made when the criteria were established in November 1993. Although this element was not in the draft version of the Action Criteria Document which underwent an informal public input period, it was included in the final version in order to provide an additional degree of protectiveness and to comply with the ALARA philosophy that EPA deemed to be an ARAR from federal and state requirements. The public was given the opportunity to comment on the ALARA principle during the comment period for the EE/CA. As described in the Action Criteria Document, the primary criterion that will be used to judge whether cleanups are performed properly is the soil concentration criterion of 5 pCi/g above background. The soil concentration criterion should be viewed as a "maximum allowable" number; the ALARA criterion simply states a preference to go as far below the soil concentration criterion as is reasonably achievable. The statement that Kerr-McGee quotes from page 6-6 of the EE/CA, that "excavation of contaminated soils continue until concentrations clearly below the target levels are achieved," has been taken out of context; that statement was made in the context of describing what, in actual practice, is likely to occur in the field due to the nature of excavation activities. Elsewhere on page 6-6, the EE/CA clearly states the ALARA concept as follows: "Limit the maximum...residual concentrations at individual locations to 5 pCi/g above background, while striving to reduce to levels nearer background the residual concentration at the greatest number of locations possible."

In previous comments, Kerr-McGee has expressed the concern, shared by some property owners as well, that there be no further cleanup required at the Site after completion of the removal action at the Site. One of the basic objectives of applying the ALARA concept at this Site (as stated on page 6-6 of the EE/CA) is to minimize the possibility that additional Site remediation would be necessary in the future, particularly in the event that contaminant-specific ARARs change in the future. When the RI/FS is conducted at this

Site and a final remedial decision made, EPA will have to consider the ARARs that exist at that time. In light of the fact that some ARARs may be changing to possibly more stringent levels, the application of ALARA now is additional insurance that the final remedial decision at this Site will be "no action." As stated in the EE/CA, historical data from cleanup activities at other sites demonstrates that residual concentrations remaining after cleanup typically are well below targeted cleanup criteria due to the way excavation activities are conducted. EPA believes it has properly and appropriately applied ALARA at this Site, and that stating it as an element of the criteria for this Site is simply putting into writing what already is done in actual practice at most cleanups. EPA is not bound to IDNS's interpretation of ALARA, which may differ from EPA's for several reasons, including different future use scenarios. The application of ALARA will not be negotiated at each property, but will be determined by EPA.

Comment: Kerr-McGee strongly supports the excavation of tailings from any highly contaminated properties in the West Chicago area and the return of that material to the West Chicago Rare Earths Facility for shipment to Envirocare. Because Kerr-McGee has previously been identified by EPA as a potentially responsible party in connection with the West Chicago Superfund Sites and has been engaged in discussions with EPA on the conduct of the removal program, Kerr-McGee has a strong interest in assuring that practical and technically sound cleanup strategies are developed and applied. To that end, over the past one and one-half years, Kerr-McGee has submitted extensive comments (listed below) to EPA in an effort to assist EPA in developing an appropriate cleanup program. We request that these earlier comments be incorporated as part of our comments on the Engineering Evaluation/Cost Analysis.

"Comments of Kerr-McGee Chemical Corporation on the Focused Risk Assessment for West Chicago Vicinity Properties and the Associated Fact Sheet" (February 25, 1993)

"Comments of Kerr-McGee Chemical Corporation on the Action Criteria for Superfund Removal Actions, West Chicago, Illinois and the Associated Fact Sheet" (March 29, 1993)

Letter from R.A. Meserve, Covington & Burling, to R. Frey and D.P. Seely, EPA, Region 5 (February 18, 1994)

Letter from R.A. Meserve to R. Frey and D.P. Seely (October 22, 1993)

Letter from R.A. Meserve to R. Frey and D.P. Seely (October 5, 1993)

Letter from R.A. Meserve to R. Frey and G.M. Schafer (June 2, 1993)

Letter from R.A. Meserve to R. Frey (May 5, 1993)

Letter from R.A. Meserve to R. Frey and M. Radell (April 28, 1993)

Response: EPA acknowledges receipt of Kerr-McGee's previous comments (listed above, dated from February 25, 1993, through February 18, 1994), in addition to Kerr-McGee's written comments dated September 16, 1994, on the EE/CA. EPA has added all Kerr-McGee comments to the administrative record for this action. Some of the issues raised in those submissions are not directly relevant to the EE/CA, but are, nonetheless, addressed below or have been addressed previously. Many of the issues were repeated in Kerr-McGee's comments on the EE/CA, which have been responded to above. Most of the issues raised were regarding the action criteria EPA has established for this site. To the extent responses have not already been provided, responses to these issues are provided below.

Comments from "Comments of Kerr-McGee Chemical Corporation on the Focused Risk Assessment for West Chicago Vicinity Properties and the Associated Fact Sheet" (February 25, 1993), as clarified by a letter from R.A. Meserve to R. Frey (March 1, 1993):

Comment: The risk assessment is only one of several studies of the risks associated with the off-site materials, and is inconsistent with the conclusions of the numerous studies that have preceded it. The Frigerio Report (1978) concluded that "there is no hazard to the public health and safety." Even EPA in the past has stated that the risks are insignificant; a 1983 letter from EPA to residents stated that "the data showed results that would be expected for ordinary homes in uncontaminated areas."

Response: The Frigerio Report's conclusion was apparently based solely on a comparison to the NRC regulatory limits at 10 CFR 20, which have since been made significantly more stringent. (For example, the report references a dose limit of 100 mrem per week, while the current limit is 100 mrem per year.) The report's conclusions also were based on the contaminated areas that had been identified and the data that had been collected at that time, and not necessarily the more recent data that was used in EPA's assessment of risks. In fact, the Frigerio Report failed to identify several of the most highly contaminated properties that Kerr-McGee found during its cleanup effort in the mid-1980s. In addition, the Frigerio Report assumed that fenced-off areas were not accessible for exposure; Superfund does not consider such access restrictions when evaluating potential risks. EPA followed standard Superfund risk assessment procedures; the Frigerio Report did not conduct a risk assessment. Lastly, Kerr-McGee has taken the 1983 EPA letter completely

out of context. That letter conveyed only the results of indoor radon/thoron measurements at 10 homes in West Chicago. As stated on page 2-9 of the EE/CA, the results at those 10 homes was generally less than 0.02 Working Levels. The letter cannot be construed as if EPA has said there are no risks at the entire Site.

Comment: The data on which EPA relies are inadequate. The properties that were studied are not typical of other contaminated properties in the area, and cannot serve as reasonable examples of properties that have already been surveyed and cleaned up in the mid-1980s. Kerr-McGee did encounter two residential properties that had extensive deposits of undiluted tailings, but these properties were clearly unusual and cannot be expected to recur.

Response: EPA's risk assessment was based on limited IDNS data that was available at the time from several properties. EPA very clearly states in the risk assessment that its analysis is limited to the properties that were the focus of the assessment. However, the levels of contamination at the properties that were studied clearly do exist at those properties. As stated above in response to previous comments, the risk evaluation is not EPA's sole justification for taking a removal action at the Site, but does help justify taking an action.

Comment: The characterization of the properties was inadequate because, in most cases, the sole data on which EPA relied were the maximum gamma measurement and a single soil sample collected from the point of the maximum gamma measurement. The risk assessment was conducted by assuming that the single gamma measurement and soil analysis were characteristic of the entirety of the contaminated area at each site. These data are clearly too sparse to provide a reliable portrayal of the properties.

Response: EPA acknowledged in the risk assessment that the available data was very limited and some conservative assumptions had to be made, and that the estimated risks therefore could be overestimated. As stated in response to previous comments, the Preliminary Focused Risk Assessment conducted by EPA fulfills the objectives of the streamlined risk evaluation necessary for the EE/CA and is consistent with EPA guidance.

Comment: EPA has significantly exaggerated the risk associated with the properties because of (1) assumptions that were made that exaggerate the risk from current and future land-use scenarios, (2) the selection of an erroneously low background gamma level, (3) several erroneous assumptions regarding indoor thoron/radon (i.e., thoron daughter equilibrium rate, and indoor radon and thoron concentration in air that are different than those used by another EPA contractor in 1986), (4) inappropriate dose conversion factors (i.e., the appropriate roentgen to rem conversion factor should be .61 instead of 1), (5)

inappropriate thoron risk values (a more appropriate risk value for thoron daughters would be between 75 and 45 per million WLM of exposure, about one-third to one-fifth that of radon daughters, instead of 180 per million WLM of exposure), and (6) unrealistic exposure assumptions (e.g., exposure times, the gardening scenario, the soil ingestion scenario). [The comment provided many technical details concerning each of these points.]

Response: (1) EPA acknowledged and justified in the risk assessment document that it had to make some conservative assumptions that may cause the risks to be overestimated. (2) As stated in response to previous comments, the selection of the background gamma level was based on consideration of more than one study, and on more recent data than the 1978 Frigerio Report, and would not significantly affect the calculations. (3) The thoron daughter equilibrium rate was based on appropriate scientific literature as cited in the risk assessment document. Similarly, the derivation of the indoor radon and thoron concentration in air is shown in Appendix A of the risk assessment document, using appropriate assumptions based on the most current information. EPA believes that the current assumptions are more appropriate for use in this action than those contained in the 1986 document. (4) Regarding the roentgen to rem dose conversion factor, the statement in the risk assessment that "one roentgen equals one rad equals one rem for the purposes of this study" is based upon the fact that one roentgen corresponds to 87.8 ergs of energy absorbed per gram of air and leads to the absorption of 95 ergs per gram in tissue. With the rad defined as 100 ergs per gram, 95 ergs per gram is, to one significant digit, 1 rad. The quality factor for gamma radiation is 1 so that 1 rad corresponds to 1 rem ($\text{rem} = \text{QF} \times \text{rad}$). Thus, the statement that one roentgen equals one rad equals one rem is justified. (5) With regard to the thoron risk value, the Science Advisory Board set a radon risk factor, but it has not set a thoron risk factor. It appears that Kerr-McGee correctly states that EPA should have selected a thoron risk factor of approximately 75, which is one-third the value for radon. However, in most cases the risks evaluated in the Focused Risk Assessment were dominated by gamma exposure risk, so adjustments to the radon/thoron risk calculations would not change the results significantly. (6) Lastly, the exposure assumptions in the risk assessment document were based on standard EPA risk assessment guidance and site-specific assumptions that might reasonably be expected to occur for a maximally exposed individual. EPA believes the exposure times, while conservative, are not implausible and were appropriate for their intended use. In most cases, neither the gardening scenario nor the soil ingestion scenario contributed significantly to the estimated risk, which was dominated by gamma exposure risk.

Comment: The risk assessment is not related to the contemplated removal actions.

Response: The focused risk assessment (and the streamlined risk evaluation in the EE/CA) helps to justify taking an action at the Site but is not EPA's sole justification for taking an action. The complete justification for the removal action is contained in the Action Memo and its administrative record. Once the decision is made to take an action, it is the cleanup criteria that have been established for the Site, and not the risk assessment, that determine which properties require remediation.

Comments from "Comments of Kerr-McGee Chemical Corporation on the Action Criteria for Superfund Removal Actions, West Chicago, Illinois and the Associated Fact Sheet" (March 29, 1993): EPA previously provided responses to these comments (see "Summary of Responses to Public Comments on March 1993 Review Draft of Action Criteria for Superfund Removal Actions, West Chicago, Illinois," December 1993; this document is included in the administrative record for this action). EPA considered all of Kerr-McGee's comments on the draft action criteria before finalizing the criteria. In fact, Kerr-McGee's comments on the draft document resulted in several changes in the final document issued by EPA in November 1993. For those aspects of the action criteria that did not change, Kerr-McGee repeated some of the same comments in its comments on the EE/CA, and responses to those are provided above.

Comments from the letter from R.A. Meserve, Covington & Burling, to R. Frey and D.P. Seely (February 18, 1994): This letter contained comments on the final Action Criteria Document that was finalized in November 1993. The comments centered around the fact that EPA did not change the 5 pCi/g soil concentration criterion in the final Action Criteria Document, and the fact that EPA added the ALARA element to the final criteria document. Many of the concerns expressed in the letter are repeated in Kerr-McGee's comments on the EE/CA, which are responded to above. The comments in the letter that were not included in Kerr-McGee's comments on the EE/CA, however, are responded to below.

Comment: Region 5 has established a cleanup standard of 5 pCi/g above background for buried radium even though the relevant EPA and IDNS standards provide a limit of 15 pCi/g above background for buried radium. It appears that the foundation for the cleanup requirement is reflected in the letter from M.T. Oge, EPA Office of Radiation and Indoor Air, to R.A. Meserve (December 7, 1993), but that letter does not adequately address Kerr-McGee's concerns.

Kerr-McGee has stated a concern that radium-228, the predominant radium isotope of concern in thorium tailings, has very different properties than radium-226 and that the cleanup standard is based on the properties of radium-226. Ms. Oge states that the soil cleanup standard that was promulgated by EPA (40 CFR 192) reflected an analysis of the risks of radium-228. This is incorrect. The document, "Final Environmental Impact Statement for Standards for the Control of Byproduct Material from Uranium Ore Processing

(40 CFR 192)," EPA 520/1-83-008-1, September 1983, ("FEIS"), discusses thorium and acknowledges that the thorium decay series is different from the uranium decay series and that thoron decay products present lesser risk than radon decay products. The analysis presented, however, relates only to the adoption of the flux standard for a tailings pile and does not bear on the selection of a radium-in-soil cleanup standard for contaminated land. The only analysis of the soil cleanup standard in the FEIS concerns the risk to persons living in homes that might be built on contaminated land, and the analysis is limited to the risk from radium-226; EPA conducted no parallel analysis of soil cleanup standards for radium-228. The NRC has found, based on an analysis of the risks from thoron and its daughters, that a far less restrictive standard for radium-228 would be justified.

Response: As noted in Ms. Oge's December 7, 1993, letter, when the standards at 40 CFR 192 were promulgated, the 5 pCi/g limit for thorium or radium in surface soils was based on both the inhalation risk from radon and thoron and the risk from gamma radiation. This basis is reflected in the preamble to the final regulation at 48 FR 600. The 5 pCi/g limit is a health-based limit that EPA considers as relevant and appropriate for use at this Site. The 15 pCi/g subsurface limit, on the other hand, is not a health-based standard, but is rather a practical "finding tool" for use in locating discrete caches of high-activity tailings (typically 300-1000 pCi/g) that were deposited in subsurface locations at mill sites or at properties in the vicinity of such mills. It is only appropriate for use as a cost-effective tool to locate radioactive waste in situations where contaminated surface materials are of high activity and are not expected to be significantly admixed with clean soil. The 15 pCi/g subsurface soil standard was not developed for situations where significant quantities of moderate- or low-activity materials are involved, such as at the Residential Areas Site.

Kerr-McGee correctly notes that the analysis of the soil cleanup standard in the FEIS is based on an analysis of the risk from radium-226. The FEIS discusses risk from gamma radiation, but because the analysis focused on radium-226, and because the risk from radon was so large, the risk from gamma radiation was not discussed in great detail (although it is discussed). If an analysis were conducted that was based solely on thoron and its daughters, such an analysis may well conclude that a less restrictive standard for radium-228 is appropriate. However, thorium mill tailings differ from uranium tailings in that the thorium-232 decay chain contributes approximately 50% more effective dose equivalent from gamma radiation than the uranium decay chain. As Ms. Oge stated in her December 7th letter, thorium-contaminated soils actually pose a higher risk from gamma radiation than do radium-226 contaminated soils.

The analysis of thorium that is presented in Appendix G of the FEIS, as Kerr-McGee notes, was conducted to evaluate the flux standard from a tailings pile. However, information in the analysis DOES bear on the radium-in-soil cleanup standard. Table G-6 (page G-11) of the FEIS indicates that, for a tailings pile, an absorbed dose rate of 21.6 mrad/year (which for gamma is equivalent to 21.6 mrem/year) results from every 1 pCi/g of thorium and its decay products. The same would also hold true for land contaminated with thorium tailings. As a result, 5 pCi/g of thorium tailings could result in over 100 mrem/year absorbed dose rate, which is above the health-based regulatory limit of 100 mrem/year recommended by the National Council on Radiation Protection and Measurements (NCRP) and applied by the NRC in regulations at 10 CFR 20. (This is one of the reasons EPA has decided to apply the ALARA principle to the cleanup at this Site, as discussed in response to previous comments.) If subsurface soils were allowed to have greater than this amount of tailings and a home were built on top of the material, EPA believes that the gamma emissions would cause the health-based limit to be exceeded. Therefore, although the primary analysis of the radium-in-soil standard focused on radium-226, information exists to demonstrate that the standard of 5 pCi/g is also a health-based limit for thorium and its decay products (such as radium-228), albeit for different reasons.

In addition, although the background documents for the standards at 40 CFR 192 may not reflect a full analysis of thorium (and radium-228), EPA Headquarters clearly was aware of the differences between uranium-chain materials and thorium-chain materials and the much higher gamma exposure rates attributable to thorium-chain materials, as reflected in a memo (Ca.1980) from J. Russell, EPA Headquarters, to L. Jensen, EPA Region 5, which can be found in the administrative record for this action. This memo states that soil contaminated with 5 pCi/g of uranium mill tailings from the ground surface to an infinite depth will produce an external dose rate of about 70 mrem/year; the same amount of thorium mill tailings, however, produces about 108 mrem/year, which is over the current regulatory limit of 100 mrem/year.

Finally, the standards promulgated under 40 CFR 192 require the same degree of cleanup for thorium-chain materials as for uranium-chain materials. It is important to note that the ARAR that was cited in the Action Criteria Document was the State regulation at Section 332.150(b) of the Illinois Administrative Code. The State regulation was based on the federal standards at 40 CFR 192.12(a), and the State standards clearly specify that the standards apply to the combined quantities of radium-226 and radium-228. It should be noted that, although Section 332.150(b) of the Illinois Administrative Code is legally "applicable" to the Rare Earths Facility and contains a limit of 5 pCi/g for surface soils and 15 pCi/g for subsurface soils, IDNS has decided that the

cleanup of the Rare Earths Facility (which is to be released for unrestricted use after cleanup) should strive to meet the ALARA goal (as interpreted by IDNS) of 5 pCi/g above background at any depth in order to meet other regulatory requirements "to maintain doses to the public and releases to the general environment as low as is reasonably achievable." (Condition 33 to Amendment No. 23 to License No. STA-583 (Sept. 1, 1994) (Attachment to letter from R.A. Meserve to E. Deamer [Sept. 16, 1994]).) It appears that IDNS believes, as EPA definitely believes at a minimum, that the 5 pCi/g limit should be applied for subsurface soils as well as surface soils in order to be protective of public health.

Comments from the letter from R.A. Meserve to R. Frey and D.P. Seely (October 22, 1993): This letter provided additional comments to EPA on the draft Action Criteria, specifically the soil concentration criterion, prior to finalization of the criteria in November 1993. These comments were considered by EPA prior to finalization of the Action Criteria Document. Some of the comments in this letter already have been addressed because they were repeated in other Kerr-McGee comments, which are responded to above. The comments in the letter that were not included in other Kerr-McGee comments, however, are responded to below.

Comment: This comment is based on Kerr-McGee's presumption that Region 5 is inclined to establish a 5 pCi/g limit for buried material because of an analysis of the risks due to radon infiltration into homes. Such an analysis is largely inapplicable because the West Chicago tailings consist principally of radium-228, not radium-226. Based on a consideration of the comparative levels of radium-226 and radium-228 in the West Chicago tailings, Kerr-McGee suggests a possible risk-based standard that reflects the actual ratios of radium isotopes in the tailings. [The comment then went on to suggest a possible risk-based standard, based solely on a consideration of the risks from radon/thoron.]

Response: As stated in response to previous comments, Kerr-McGee's presumption is incorrect. EPA has established the 5 pCi/g standard as a criterion for subsurface soils in order to protect public health not only from radon and thoron but from the significant gamma emissions attributable to thorium-chain materials. Therefore, EPA believes that Kerr-McGee's suggested risk-based standard would not be protective of public health and is not appropriate for this Site.

Comments from the letter from R.A. Meserve to R. Frey and D.P. Seely (October 5, 1993): This letter provided additional Kerr-McGee comments on the draft Action Criteria, specifically the indoor radon criterion. Most of the comments in this letter were repeated in Kerr-McGee's comments on the EE/CA, which are responded to above. One comment that was not included in Kerr-McGee's comments on the EE/CA is responded to below.

Comment: With respect to indoor radon/thoron levels, we urge EPA to determine through a limited sampling program whether an indoor radon limit is necessary. For example, EPA might undertake a program in which it makes measurements of indoor radon at some of the properties at which tailings are known or determined to be present and, if elevated levels of radon are found, to assess the cause. We believe that such a program will demonstrate that the application of a radon limit is simply inappropriate in the West Chicago circumstance.

Response: EPA has decided to take just such an approach. During the time from January 1994 to April 1994, EPA conducted the first phase of indoor radon/thoron and indoor gamma surveys at less than 100 properties in the West Chicago area, some of which are known to have tailings contamination. Based on an evaluation of the results from this first phase of sampling, EPA will decide whether to continue such sampling at all properties within the study area or to scale-back on such sampling.

Comments from the letter from R.A. Meserve to R. Frey and G.M. Schafer (June 2, 1993): This letter provided documents related to cleanup standards at three other sites (i.e., Record of Decision for Montclair/West Orange Radium Site, N.J.; Record of Decision for Monticello Vicinity Properties Site, UT; Memo regarding removal action at Bluewater Uranium Mine Sites, N.M.).

Comment: Kerr-McGee urges EPA to consider the above documents before finalizing the Action Criteria for this Site.

Response: EPA was aware of this information, as well as information related to other sites around the country, and considered it prior to finalizing the Action Criteria Document in November 1993.

Comments from the letter from R.A. Meserve to R. Frey (May 5, 1993): This letter was in regards to an article that had been published in a local newspaper regarding the possibility of using Manville Oaks Park (owned by the West Chicago Park District) as an interim storage location. It is not relevant to the EE/CA or this action because EPA is no longer considering any interim storage location other than the Kerr-McGee Rare Earths Facility.

Comments from the letter from R.A. Meserve to R. Frey and M. Radell (April 28, 1993): This letter reiterated comments and concerns that Kerr-McGee had expressed to EPA during an April 1993 meeting between the two parties and in Kerr-McGee's written comments on the draft Action Criteria Document. EPA has responded to these comments and concerns in response to previous comments.

END

**ACTION CRITERIA
FOR SUPERFUND REMOVAL ACTIONS
AT THE KERR-McGEE RESIDENTIAL AREAS SITE
WEST CHICAGO, ILLINOIS**

**Prepared by
U.S. EPA Region 5**

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**ACTION CRITERIA
FOR SUPERFUND REMOVAL ACTIONS
AT THE KERR-McGEE RESIDENTIAL AREAS SITE
WEST CHICAGO, ILLINOIS**

Introduction

Under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (commonly known as Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986, the United States Environmental Protection Agency (U.S. EPA) is authorized, among other things, to take response actions whenever there is a release or threat of a release of a hazardous substance into the environment. The National Priorities List (NPL) is a list of hazardous waste sites across the country that are eligible for U.S. EPA response actions under Superfund.

The U.S. EPA has listed four sites in the vicinity of the City of West Chicago, Illinois, on the NPL. The primary contaminants of concern at these sites are radioactive thorium and its decay products derived from ore processing operations at a factory in West Chicago, now known as the Kerr-McGee Chemical Corporation West Chicago Rare Earths Facility ("factory site"). Three of the NPL sites became contaminated when the processing wastes (thorium mill tailings) were removed from the factory and used primarily as fill material in and around the City of West Chicago. These sites are known as:

- (1) Kerr-McGee (Residential Areas) site,
- (2) Kerr-McGee (Sewage Treatment Plant) site, and
- (3) Kerr-McGee (Reed-Keppler Park) site.

The fourth site became contaminated when discharges and runoff from the factory site traveled via a storm sewer into nearby Kress Creek and downstream to the West Branch of the DuPage River. This site is known as:

- (4) Kerr-McGee (Kress Creek/West Branch of DuPage River) site.

It is important to note that the Residential Areas site may encompass not only residential properties, but also institutional, commercial and municipal properties. Although primarily contaminated because thorium mill tailings were used as fill, some of the properties may have become contaminated due to windblown material from the factory site.

The Kerr-McGee factory site from which the contamination originated has not been listed on the NPL; it is regulated under the licensing authority of the Illinois Department of Nuclear Safety (IDNS). Decommissioning, clean-up and closure of the factory site currently is being addressed under that authority.

Purpose and Intent

The purpose of this document is to establish criteria for U.S. EPA's response actions at contaminated properties ("Residential Areas") that are not part of the Sewage Treatment Plant, Reed-Keppler Park or Kress Creek/West Branch of DuPage River sites. Those three NPL sites will be addressed by U.S. EPA in separate actions.

It is the intent of the U.S. EPA to address the contamination problems at the Residential Areas by removal actions wherever practicable. Removal actions generally provide more immediate protection than do long-term remedial actions, and are consistent with the movement in the Superfund program to accelerate site cleanups.

U.S. EPA's actions under Superfund will be limited to those properties where the contamination is attributed to process wastes (thorium mill tailings) from the factory site. When naturally occurring radioactive materials not associated with process wastes cause U.S. EPA's action criteria to be exceeded, any corrective actions will have to take place through a separate mechanism, because Superfund generally does not give U.S. EPA the authority to remediate threats from naturally occurring substances.

This document contains the criteria that U.S. EPA will use to designate properties for removal actions and to verify that cleanup to levels protective of human health and the environment has been achieved. The U.S. EPA does not have standardized criteria for removal actions of this type. Consequently, site-specific criteria have been developed by the U.S. EPA in consultation with the IDNS for use at the Residential Areas. The criteria specified in this document will be used during three separate phases of the cleanup action: the **discovery phase**, the **characterization phase**, and the **verification phase**. Each of these phases and the criteria for each are described in detail later in this document. This document also contains release criteria for releasing equipment from work sites for unrestricted use.

Applicable or Relevant and Appropriate Requirements

Under Superfund, long-term remedial actions must attain Federal and more stringent State "applicable or relevant and appropriate requirements" (ARARs) during and at the completion of the remedial action. Removal actions (such as the type planned at the Residential Areas) must attain ARARs to the extent practicable. Therefore, U.S. EPA relied upon Federal and State ARARs to the extent practicable to establish the criteria in this document.

"Applicable requirements" are cleanup standards or other environmental protection requirements that specifically apply to the substances or activities at the site. In other words, an applicable requirement is one that a private party would have to comply with by law if the same action was being taken apart from Superfund authority.

If a requirement is not applicable, it still may be relevant and appropriate. "Relevant and appropriate requirements" are those cleanup standards that address problems or situations sufficiently similar to those at the Superfund site that their use is well suited to the particular site. A relevant and appropriate requirement must be both relevant to the conditions at the site and appropriate for use at the site, given the circumstances.

If a Federal or State requirement is neither applicable nor relevant and appropriate (and thus not an ARAR), it still may be useful to U.S. EPA when determining the necessary level of cleanup for protection of human health and the environment. Such "to-be-considered" material (TBCs) can include

promulgated regulations that do not qualify as ARARs, and non-promulgated advisories or guidance issued by Federal or State government. Superfund actions are not required to meet TBCs.

Only requirements that are duly promulgated under Federal or State law can be ARARs. Additionally, only substantive requirements of regulations, not procedural requirements, can be ARARs for on-site actions.

The U.S. EPA has identified the following major sources of ARARs and TBCs for the cleanup actions at the Residential Areas:

Title 40, Part 192 of the Code of Federal Regulations (40 CFR 192), entitled "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings" - 40 CFR 192 contains U.S. EPA's standards for cleanup of lands contaminated by uranium and thorium mill wastes. The standards apply only to the sites specifically designated under the Uranium Mill Tailings Radiation Control Act of 1978, but they often have been used as criteria at uranium, thorium and radium sites because of the similarity of the problems. They are not applicable to the Residential Areas, but U.S. EPA considers portions to be relevant and appropriate.

Title 32, Chapter II, Subchapter b, Part 332 of the Illinois Administrative Code, entitled "Licensing Requirements for Source Material Milling Facilities" - These regulations deal with licensing requirements for source material milling facilities in Illinois and apply to the Kerr-McGee factory site in West Chicago. They are not applicable to the Residential Areas, but U.S. EPA considers portions to be relevant and appropriate and portions to be TBCs.

Title 32, Chapter II, Subchapter b, Part 340 of the Illinois Administrative Code, entitled "Standards for Protection Against Radiation" - These regulations establish standards for protection against radiation hazards, primarily in an occupational setting; they control the possession, use and transfer of sources of radiation by "licensees and registrants" so that the total dose to an individual does not exceed specified standards. They also contain decontamination guides for the release of equipment for unrestricted use. These regulations are not applicable to the Residential Areas, but U.S. EPA considers portions to be relevant and appropriate.

DOE Order 5400.5, entitled "Radiation Protection of the Public and the Environment" - This Order establishes standards and requirements for Department of Energy (DOE) operations with respect to protection of members of the public against undue risk from radiation, and contains a discussion of DOE's "ALARA" (As Low As Reasonably Achievable) approach. The Order is not a promulgated Federal or State regulation, and thus cannot be an ARAR, but U.S. EPA considers portions of the Order to be TBCs.

Title 10, Part 20 of the Code of Federal Regulations (10 CFR 20), entitled "Standards for Protection Against Radiation" - These regulations contain the Nuclear Regulatory Commission's standards for protection against radiation, and contain an "ALARA" approach. They are not applicable or relevant and appropriate to the Residential Areas, but U.S. EPA considers portions to be TBCs.

U.S. Nuclear Regulatory Commission's Regulatory Guide 8.37 - This regulatory guide contains, among other things, a discussion of the NRC's "ALARA" approach. The regulatory guide is not a promulgated regulation, and thus cannot be an ARAR, but U.S. EPA considers a portion of the guide to be a TBC.

U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86 - This regulatory guide contains, among other things, decontamination guides for the release of equipment for unrestricted use. The regulatory guide is not a promulgated regulation, and thus cannot be an ARAR, but U.S. EPA considers a portion of the guide to be a TBC.

The Action Criteria

The remainder of this document describes the different phases of the cleanup action, the specific Federal and State requirements that U.S. EPA considers to be ARARs or TBCs, and the resulting action criteria for each phase of the cleanup action.

DISCOVERY AND CHARACTERIZATION PHASES

The first phase of the cleanup action is the **discovery** phase. During this phase, properties in and around the City of West Chicago will be surveyed and sampled to discover and designate those that require cleanup. If a property clearly exceeds the discovery criteria, and if it is clear that the exceedance is due to thorium mill tailings from the factory site, the property will be designated for removal action. If it is not clear whether a property exceeds the discovery criteria (i.e., borderline results), or if it is not clear whether exceedance of the criteria is due to thorium mill tailings, then further investigation will be needed before a decision can be made to designate that property for response action. Such properties will move into the **characterization** phase.

Because the objective of both discovery and characterization is the same (i.e., to find contaminated properties), the action criteria during these two phases are identical. Properties deemed not to exceed the action criteria during either discovery or characterization will be excluded from further consideration.

Due to the nature of the radiological contamination at the Residential Areas, survey efforts during the discovery phase will consist of measuring and/or sampling the following four parameters: outdoor soil concentration, outdoor

gamma exposure rate, indoor gamma exposure rate and indoor radon/thoron air concentration.

The primary criterion that will be used to designate a property for response action is outdoor soil concentration. The other three parameters (outdoor gamma exposure rate, indoor gamma exposure rate and indoor radon/thoron air concentration) will be used as indicators or "finding tools" to help locate contaminated areas; elevated readings for any of these three parameters alone generally will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

The U.S. EPA has taken a conservative approach with the discovery and characterization criteria in order to minimize the chances of not discovering properties where contamination actually is present. As a result, the discovery criteria may be more stringent than the verification criteria (e.g., for outdoor soil concentrations, the results will not be averaged over 100 square meters during discovery and characterization, but averaging over 100 m² may be conducted during the verification phase).

For indoor radon/thoron, the necessity for expeditious surveillance argues for measurements on a shorter time frame than the annual average (or equivalent) associated with the wording of the relevant and appropriate requirement. In order to not unduly delay assessments, discovery and characterization measurement periods may be on the order of 2 days to 3 months. Since weather, seasons and home usage all influence indoor radon/thoron levels, these shorter measurements may not fully characterize the annual average but should be adequate to serve as "finding tools." Also, many homes may have elevated levels of naturally occurring radon that are not associated with the presence of thorium mill tailings on the property. For these reasons, an elevated reading of indoor radon/thoron will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Discussed below are the criteria that will be used during the discovery and characterization phases of the response action:

- **Outdoor Soil Concentration**

Soil standards for mill tailings of the type present at the Residential Areas are found in 40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," and at Section 332.150(b) of the Illinois Administrative Code. None of the standards are applicable to the Residential Areas, but portions are relevant and appropriate. Because the State standard is more stringent than the Federal standard (by specifying that the concentration limit is for dry soil), the State regulation is considered as the ARAR.

The State regulation at Section 332.150(b) of the Illinois Administrative Code specifies that the licensed site shall be

decontaminated to the following limits prior to termination of the license:

"Concentrations of radionuclides in soil above background concentrations for total radium, averaged over areas 100 square meters, shall not exceed:

- A) 5 picocuries per gram of dry soil, averaged over the first 15 centimeters below the surface; and
- B) 15 picocuries per gram of dry soil, averaged over layers of 15 centimeters thickness more than 15 centimeters below the surface."

The State requirements in Section 332.150(b) of the Illinois Administrative Code were based on the federal standards in 40 CFR 192.12(a). When the federal standards in 40 CFR 192 were developed over a decade ago, the 5 picocuries per gram (pCi/g) standard was a health based standard, but the 15 pCi/g standard for subsurface soil was technology based, reflecting instrument limitations in locating subsurface deposits. The 15 pCi/g limit is not a health-based standard, and should not be applied to situations in which a health-based standard is appropriate, or to situations that differ substantively from those for which it was derived.

The 15 pCi/g limit was developed as a practical measurement tool for use in locating discrete caches of high activity tailings (typically 300-1000 pCi/g) that were deposited in subsurface locations at mill sites or at nearby properties. The subsurface soil standard in 40 CFR 192 was originally proposed as 5 pCi/g. The final standard was changed, not because the health basis was relaxed, but rather in order to reduce the cost to DOE of locating buried tailings - under the assumption that this would result in essentially the same degree of cleanup at the DOE sites as originally proposed under the 5 pCi/g criterion. The use of a 15 pCi/g subsurface criterion allowed the DOE to use field measurements rather than laboratory analysis to determine when buried tailings had been detected. It is only appropriate for use as a cost-effective tool to locate radioactive waste in situations where contaminated subsurface materials are of high activity and are not expected to be significantly admixed with clean soil. The 15 pCi/g subsurface criterion was not developed for situations where significant quantities of moderate or low activity materials are involved, such as at the Residential Areas site. Therefore, the 15 pCi/g subsurface criterion is not appropriate for use at the Residential Areas site, and thus is not an ARAR. The 5 pCi/g standard, on the other hand, was developed as a health-based standard and is appropriate for use at the Residential Areas site.

Although the soil concentration standard in the regulation is written in terms of an average over an area of 100 square meters, areal averaging will not be conducted during discovery and characterization. This approach is conservative and should minimize the chances of not identifying contamination during the discovery and characterization surveys.

Therefore,

The Discovery and Characterization Criterion for outdoor soil concentrations will be exceedance of 5 picocuries per gram total radium (radium-226 plus radium-228), dry soil, above background in any 15 centimeter depth based upon Section 332.150(b) of the Illinois Administrative Code.

- Outdoor Gamma Exposure Rates

Section 332.150(b) (2) of the Illinois Administrative Code, "Termination of Source Material Milling Facility License," deals with a site licensed by IDNS that is to be decontaminated for license termination. It states that the licensed site shall be decontaminated to the following limits prior to termination of the license:

"The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background."

This regulation applies only to a licensed site, but the requirements are relevant to the Residential Areas since the intent of the standards is to limit public exposure from site-related radioactive materials.

The variability and distribution of naturally-occurring radioactive materials results in a range of normal background levels, even within a small region such as a few mile radius around West Chicago. In part, this originates from variable geological constituents and in part from human actions (such as phosphate fertilization which can add additional radium to the soil). Consequently, there is not a single number that can be said to be "background" for the entire West Chicago region. While not represented by a single number, the normal background levels of gamma exposure rate will fall within a range and in a fairly predictable statistical pattern. Consequently, a statistical method will be applied to both establish background and what is distinctly above background.

Because there are sources unrelated to thorium mill tailings (such as phosphate fertilizers) that could cause elevated gamma readings at the Residential Areas, it is not appropriate to use the background gamma standard during the discovery phase as a strict, single criterion that, in and of itself, triggers cleanup. However, U.S. EPA will use measurements of outdoor gamma exposure rate as a "finding tool" to locate those areas that are statistically distinct from background. Gamma readings found to be statistically distinct from background at a property will be an indication of possible thorium mill tailings contamination. Such areas will, at a minimum, be investigated further. Elevated gamma readings alone generally will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Because the background gamma standard will be used extensively as a "finding tool" and not as a strict criterion, exposure rates may be measured at varying heights from the ground surface (typically, 0 to 1 meter), depending on detection sensitivities, practicality, and other conditions encountered in the field.

Therefore,

The Discovery and Characterization Criterion for outdoor gamma exposure rate will be the statistical exceedance of background based upon the Illinois Administrative Code, Section 332.150(b) (2).

● Indoor Gamma Exposure Rates

The only promulgated standard that specifically deals with indoor gamma exposure rate is 40 CFR 192.12(b) (2), which states that the objective of remedial action shall be that

"In any occupied or habitable building---...The level of gamma radiation shall not exceed the background level by more than 20 microrentgens per hour."

Gamma ray exposure to 20 microrentgens per hour for a substantial portion of the year could result in an annual dose exceeding 100 millirem, due solely to external exposure to gamma rays. Recommendations by eminent bodies of radiation scientists, and regulations and policies of federal agencies such as the Nuclear Regulatory Commission and the Department of Energy, are to limit doses to members of the general public to less than 100 millirem per year, including both external exposure (from gamma rays) and internal exposure (from inhalation and ingestion). In addition, NRC's regulations at 10 CFR 20, DOE Order 5400.5 and NRC Regulatory Guide 8.37 contain an "ALARA" (As Low As Reasonably Achievable) approach, which sets forth an objective to attain dose levels as far below the dose limits as practicable. Moreover, EPA believes that individual sources of contamination should be kept to a small fraction of the primary limit of 100 millirem per year, and generally sets annual dose standards below a couple of tens of millirems.

As a result of the above considerations, 40 CFR 192.12(b) (2) is not appropriate for use at the Residential Areas site, and thus is not an ARAR.

Although meant to apply to outdoor situations, the gamma exposure rate standard found at Section 332.150(b) (2) of the Illinois Administrative Code is a TBC for indoor gamma exposure rate, since the intent is to limit public exposure to site-related radioactive materials, and since periods of occupancy are higher indoors than outdoors.

As with outdoor gamma exposure rate, normal background values for indoor gamma exposure rate will fall within a range and in a fairly predictable statistical pattern; background is not a single value and must be treated statistically. In addition, different building materials (such as bricks, concrete blocks and granite hearths) that contain naturally occurring radiological materials could cause elevated indoor gamma readings that are unrelated to thorium mill tailings. For these reasons, U.S. EPA will use measurements of indoor gamma exposure rate as a "finding tool" to locate contaminated areas that may be below or alongside the foundations of buildings. Elevated indoor gamma readings alone generally will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Therefore,

The Discovery and Characterization Criterion for indoor gamma exposure rate will be the statistical exceedance of background, based upon the Illinois Administrative Code, Section 332.150 (b) (2) .

As with outdoor gamma exposure rate, a statistical method will be applied to both establish background and what is distinctly above background.

- Indoor Radon/Thoron Decay Product Concentrations

Standards dealing with indoor radon decay product concentrations are found at 40 CFR 192.12 (b) (1), which states that:

"In any occupied or habitable building-- The objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL..." (WL, or working levels, is a measure of the concentration of radon decay products.)

While radon-222 (commonly known just as radon) is produced from the Uranium Decay Series, radon-220 (commonly known as thoron) is the Thorium Decay Series form of radon. 40 CFR 192.40 (b) states that the provisions of the standard applicable to radon also apply to thoron. U.S. EPA interprets the radon decay product concentration of 0.02 WL at 40 CFR 192.12 (b) (1) to represent the combined (total) concentration of decay products from both radon and thoron.

In the absence of the thorium mill tailings, naturally-occurring decay product concentrations consist primarily of radon, with thoron decay product levels at about 25% to 50% of those of radon. However, since the thorium decay series radionuclides dominated in the ores used at the factory site, it is reasonable to assume that contaminated properties may show elevated levels of thoron if tailings are located below or

alongside the foundation of a building. However, because of different half lives in the thoron decay series, and depending on the location of the tailings, not every contaminated property will show elevated levels of thoron.

Due to the need for expeditious surveillance, measurements during the discovery and characterization phases will occur over a shorter time frame than the annual average (or equivalent) associated with the wording of the relevant and appropriate requirement. In order to not unduly delay assessments, discovery and characterization measurement periods may be on the order of 2 days to 3 months. Since weather, seasons and home usage all influence indoor radon/thoron levels, these shorter measurements may not fully characterize the annual average but should be adequate to serve as "finding tools."

As with outdoor and indoor gamma exposure rate, there is a natural variability in the range of indoor radon/thoron decay product concentrations. Some areas of West Chicago, as in other parts of the country, may have naturally high levels of indoor radon that are totally unrelated to thorium mill tailings. For these reasons, U.S. EPA will use measurements of indoor radon/thoron decay product concentrations as a "finding tool" to help locate contaminated areas that may be below or alongside the foundations of buildings. Elevated indoor radon/thoron decay product readings alone will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Therefore,

The Discovery and Characterization Criterion for indoor radon/thoron decay product concentrations is 0.02 WL combined radon and thoron decay products (including background) based upon 40 CFR 192.12 (b) (1).

If a property exceeds this criterion due to naturally-occurring radon, and there is no other indication of thorium mill tailings on the property, the property will not be remediated as part of this Superfund action.

- **"As Low As Reasonably Achievable" (ALARA)**

As discussed above, NRC's regulations at 10 CFR 20, DOE Order 5400.5 and NRC Regulatory Guide 8.37 all contain an ALARA approach which sets forth the objective to attain dose levels as far below the dose limits as practicable. These requirements are TBCs for the removal actions at the Residential Areas.

In addition, Section 340.1000(b) of the Illinois Administrative Code is a TBC for the removal actions at the Residential Areas. Section 340.1000(b), which applies to "licensees and registrants," states,

"In addition to complying with the requirements set forth in this Part, every reasonable effort should be made to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as low as is reasonably achievable. The term 'as low as is reasonably achievable' means as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of ionizing radiation in the public interest."

The NRC regulations at 10 CFR 20 contain similar language.

As a result, during discovery and characterization, the following ALARA approach will be used for the Residential Areas site:

Every reasonable effort should be made to maintain radiation exposures, and the amount of radioactive materials in unrestricted areas, to levels that are as low as is reasonably achievable.

VERIFICATION PHASE

Once a property has been designated for a removal action, the success of the operation must be verified during and at the completion of the removal action. During the verification phase, properties will be surveyed and sampled to ensure that cleanup to levels protective of human health and the environment has been achieved.

As indicated below, some of the verification criteria will be applied during and immediately following the removal action, with surveys and samples collected before the open excavation is backfilled with clean material. Some of the verification criteria will be applied later, with surveys and samples collected after the excavation is backfilled.

The criteria to be used during the verification phase are as follows:

- Outdoor Soil Concentrations

The Verification Criterion for this parameter will be soil concentrations that do not exceed 5 picocuries per gram total radium (radium-226 plus radium-228), dry soil, above background, averaged over areas up to 100 square meters, in any 15 centimeter depth based upon Section 332.150(b) of the Illinois Administrative Code.

Samples for outdoor soil concentrations will be collected before backfilling.

- Outdoor Gamma Exposure Rates

During cleanup of a property, as during the discovery and characterization phases, outdoor gamma exposure rates will be used as a "finding tool" to help determine where additional excavation may be needed. The main criterion to determine when excavation can cease, however, is the outdoor soil concentration criterion.

However, Section 332.150(b) (2) of the Illinois Administrative Code (which requires that, prior to termination of the license, the licensed site be decontaminated so that "The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background") is relevant to the Residential Areas, and is appropriate for application at the completion of a cleanup action at a property.

Therefore,

The Verification Criterion for this parameter will be outdoor gamma exposure rates that do not statistically exceed background at a distance of 100 centimeters from the surface, based upon the Illinois Administrative Code, Section 332.150(b) (2).

Outdoor gamma exposure rate surveys to verify that this criterion has been met will be conducted after backfilling. A statistical method will be applied to both establish background and what is distinctly above background.

- Indoor Gamma Exposure Rates

For properties that require cleanup and that were found, during discovery and characterization, to have elevated levels of indoor gamma exposure rate due to thorium mill tailings contamination on the property, indoor gamma exposure rate surveys will be used during the cleanup action as a "finding tool" to help determine if additional excavation is necessary.

The Verification Criterion for this parameter will be indoor gamma exposure rates that do not statistically exceed background based upon the Illinois Administrative Code, Section 332.170(c).

For properties that require cleanup, but for which no elevated indoor gamma readings were found during discovery and characterization, indoor gamma surveys will not be conducted during the verification phase.

- Indoor Radon/Thoron Decay Product Concentrations

For properties that require cleanup and that were found, during discovery and characterization, to have elevated levels of indoor radon/thoron decay product concentrations due to thorium mill tailings contamination on the property, additional surveys will be conducted at the completion of the cleanup action to determine if the following verification criterion has been met:

In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) combined radon and thoron decay product concentration (including background) not to exceed 0.02 WL. In any case, the combined radon and thoron decay product concentration (including background) shall not exceed 0.03 WL. (Based on 40 CFR 192.12(b)(1).)

For properties that require cleanup, but for which no elevated indoor radon/thoron decay product concentrations due to thorium mill tailings were found during discovery and characterization, indoor radon/thoron testing will not be required during the verification phase.

- **"As Low As Reasonably Achievable" (ALARA)**

In addition to meeting the verification criteria described above, the following ALARA approach will be used during cleanup actions:

Every reasonable effort should be made to maintain radiation exposures, and the amount of radioactive materials in unrestricted areas, to levels that are as low as is reasonably achievable.

RELEASE CRITERIA

In addition to the above criteria for discovery, characterization and verification, it will be necessary throughout the project to release equipment from work sites and it may be necessary to assess whether materials or surfaces are suitable for unrestricted use. Requirements for such situations are found in the Illinois Administrative Code, Section 340, Appendix C(a); these requirements are relevant and appropriate for use at the Residential Areas. Similar requirements also are found in the U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86, Table 1; these guidelines are not ARARs (since only promulgated regulations can be ARARs), but the U.S. EPA does consider them to be TBCs.

Both sets of requirements are shown below. Since the requirements are set up with differing units, the most restrictive part for a given situation would be used.

● Illinois Administrative Code, Section 340, Appendix C(a)

DECONTAMINATION GUIDES

a) Surface Contamination Guide

Alpha Emitters

Removable	15	pCi per 100 cm ² =	average over any one surface
	33	dpm per 100 cm ²	
	45	pCi per 100 cm ² =	maximum
	100	dpm per 100 cm ²	
Total (fixed)	450	pCi per 100 cm ² =	average over any one surface
	1,000	dpm per 100 cm ²	
	2,250	pCi per 100 cm ²	maximum
	5,000	dpm per 100 cm ²	
0.25 mRem per hour at 1 cm			

Beta-Gamma Emitters

Removable (all beta-gamma emitters except Hydrogen 3)	100	pCi per 100 cm ²	average over any one surface
	500	pCi per 100 cm ²	maximum
Removable (Hydrogen 3)	1,000	pCi per 100 cm ²	average over any one surface
	5,000	pCi per 100 cm ²	maximum
Total (fixed)	0.25 mRem per hour at 1 cm from surface		

- U.S. Nuclear Regulatory Commission, Regulatory Guide 1.86, Table 1

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDE ^a	AVERAGE ^{b,c}	MAXIMUM ^{b,d}	REMOVABLE ^e
U-nat, U-235, U-238, and associated decay products	5,000 dpm α per 100 cm ²	15,000 dpm α per 100 cm ²	1,000 dpm α per 100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm per 100 cm ²	300 dpm per 100 cm ²	20 dpm per 100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm per 100 cm ²	3000 dpm per 100 cm ²	200 dpm per 100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β - γ per 100 cm ²	15,000 dpm β - γ per 100 cm ²	1000 dpm β - γ per 100 cm ²

^a Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^d The maximum contamination level applies to an area of not more than 100 cm².

^e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

Criteria Not Chosen for Discovery, Characterization or Verification

Discussed below are other parameters and their associated regulations and standards that were reviewed by U.S. EPA to determine whether they were ARARs and should be used as discovery, characterization and/or verification criteria. None of these standards is applicable to the removal action and, as explained below, none is relevant and appropriate.

- **Outdoor Radon Concentrations**

Outdoor radon (radon-222) and thoron (radon-220) are regulated in Section 332.170(b) of the Illinois Administrative Code:

"During the operating life and facility decommissioning, the combined concentration of radon and thoron at the boundary of the licensed site, measured at a height of one meter from the surface, averaged annually, shall not exceed three picocuries per liter above the background concentration at the licensed site."

Even though on its terms the regulation applies only to a licensed facility, the intent of the regulation is to control radon and thoron in off-site areas, since the point of compliance is at the boundary of the licensed site. Therefore, the U.S. EPA considers the regulation to be relevant to the Residential Areas.

However, there are practical reasons why measurements for radon and thoron outdoors will not aid in the identification of contaminated properties not otherwise identified by outdoor gamma exposure rate surveys and outdoor soil concentration samples. These reasons are as follows: (1) Reliable radon and thoron measurements are not immediate, but can take days or weeks to measure good averages. Gamma surveys, on the other hand, can provide instantaneous measurements; (2) Unless the emissions are extremely large, radon and thoron emitted from the ground surface will rapidly mix in the open air, making them indistinguishable from naturally occurring radon and thoron. Large radon and thoron emissions would be associated with large contaminant deposits easily identifiable by gamma survey instruments; (3) Because radon and thoron are gases that can be transported by the wind, it would be much harder to pinpoint the emission site.

Therefore, for the reasons stated above, outdoor radon concentrations (radon and thoron), though relevant, are not appropriate to these circumstances and will not be one of the criteria for this response action.

- **Radon Release Rates from Soil**

The emission of radon (radon-222) and thoron (radon-220) from soils is regulated in Section 332.170(c) of the Illinois Administrative Code, which states:

"The disposal area shall be designed so that after reclamation and stabilization, the annual total radon release rate through the cover from the byproduct material shall not exceed two picocuries per square meter per second."

This regulation only applies to the disposal area at a licensed facility, but the intent of the regulation is to control the total radon emission to the environment and to protect the general population.

However, Section 332.240(a) of the Illinois Administrative Code states:

"Monitoring for total radon after installation of an appropriately designed cover is not required. Total radon emissions from cover material shall be estimated as part of developing a closure plan."

Since it appears that the State never intended that actual measurements be made to show compliance with the regulation, the U.S. EPA does not consider this regulation to be relevant and appropriate for use at the Residential Areas. In addition, there are other, practical reasons why measurements of radon and thoron emissions from soil would not be an appropriate indicator of contaminants. At the Residential Areas, thoron is the dominant radon isotope of concern. If thoron is produced at a depth of more than a few inches below the ground surface, it will radioactively decay to a solid element and cease moving through the soil before reaching the surface. Soil sampling, on the other hand, will find contaminants at much greater depth, as would gamma exposure rate measurements which penetrate soil depths on the order of several feet.

Consequently, measurements for radon and thoron emission rates will not be conducted during this response action.

- Doses in the General Environment

Thorium-related doses in the general environment are regulated in 40 CFR 192.41(d), which states:

"Operations...shall be conducted in such a manner as to provide reasonable assurance that the annual dose equivalent does not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as a result of exposures to the planned discharge of radioactive materials, radon-220 and its daughters excepted, to the general environment."

Doses in the general environment also are regulated in Section 332.170(a) of the Illinois Administrative Code, which states:

"At all times, concentrations of radioactive material, excluding radon, thoron, and their progeny, which may be released to the general environment in groundwater, surface water, air, soil, or other means shall not result in a committed effective dose in excess of 25 millirem (0.25 mSv) to the whole body, and a

committed dose equivalent in excess of 75 millirem (0.75 mSv) to the thyroid, and 25 millirem (0.25 mSv) to any other organ of any member of the public."

* mSv designates milliSieverts, a dose unit equal to 100 millirem.

Neither of the above regulations is applicable to the Residential Areas, but the U.S. EPA considers both to be relevant.

Even though the dose requirements of 40 CFR 192.41(d) and Section 332.170(a) of the Illinois Administrative Code are relevant to the Residential Areas, there are practical reasons why performing dose assessment calculations will not aid in the identification of contaminated properties not otherwise detected by the other discovery criteria. An operational assumption for this response action is that where site parameters such as indoor or outdoor gamma exposure rate, outdoor soil concentrations, or indoor radon and thoron are elevated, dose is elevated proportionally. Therefore, having specific dose calculations is not appropriate as it will not provide useful information not already provided by other parameters. Consequently, no separate dose assessment calculations will be required for this response action.